bonded" to what? Would connecting cases of two computers in a rack satisfy this requirement? It would according to the definition of "bonding."

The existing requirement should be made more clear and specific, instead the rewording in the proposed panel action makes the requirement less specific. The appropriate change would be to revise 250.114 using a language similar to the following:

"...exposed non-current-carrying metal parts of cord- and plug-connected equipment likely to become energized shall be connected to an equipment grounding conductor run with the circuit conductors."

This discussion applies to the majority of changes accepted in this proposal. This proposal will reduce the clarity of the NEC and should be rejected.

BRENDER: See my Explanation of Negative Vote on Proposal 5-1.

BRETT: See my Explanation of Negative Vote on Proposals 5-1 and 5-41.

HAMMEL: See my Explanationof Negative Vote on Proposal 5-1.

RAPPAPORT: I agree with the panel to reject the reorganization and I reject changing the term "equipment grounding conductor" to "equipment bonding conductor". See my Explanation of Negative Vote on Proposal 5-1.

STEINMAN: NEMA disagrees with the panel action. The proposal has fostered significant debate in the Code process. After considering all debate, it is clear that the issue is one of education and not terminology. Changing the term "grounding" to "bonding" in no way changes the need for qualified persons and continuing education. The present terminology is well understood by those who understand the purposes of grounding and bonding. The panel members and public need to consider the magnitude of the change compared to the benefit. The change will create a nightmare of revisions and changes in terminology across the electrical system. The benefit is practically nonexistent.

Comment on Affirmative:

DOBROWSKY: Changing the term "equipment grounding conductor" (EGC) to "equipment bonding conductor" (EBC) will improve the NEC's usability and reduce misinterpretations. Presently the terms "grounding", "bonding", and their derivatives are frequently used interchangeably - sometimes when describing very different requirements. In most cases, the "EBC" will still have a connection to the system grounding point" but the grounding electrode conductor actually accomplishes the grounding.

Because of the excellent work done by CMP 1 by adding a fine print note, indicating that in previous NEC editions "EGC" was used to describe "EBC," product standards and manufacturer's literature can be updated during their normal revision processes. This will minimize the financial impact to the electrical industry yet allow an improvement that uses the terms consistently. Implementing the change at the ROP stage of the process will highlight any sections that need to be adjusted before the 2005 NEC revision is completed.

Other definitions contained in Article 100 also need modification to improve the understanding of grounding and bonding concepts. As the submitter, I was fortunate to be included in discussions with many individuals concerned with the proposed changes in terms. The amount of confusion is clearly apparent.

JOHNSTON: The inclusion of the term "and bonding" in the title of the article is consistent with the statements in the scope of the article. Bonding is a primary performance function addressed in the article even more frequently than grounding. Both words in the title appear to be appropriate. This action is also consistent with the consensus, comments, and action of Panel 5 to proposal 5-1 at the ROP hearings in January 2003. I concur with the consensus of CMP 05 in the changing the term "equipment grounding conductor" to "equipment bonding conductor". I agree that the method of incorporating this change into the NEC is going to involve a planned effort and long term will have significant benefits in the interest of safety.

MELLO: The task force review of Article 250 was complete and found numerous uses of terms that in reality are undefined and create confusion. When one applies the simple filter on if the conductor is going to carry fault current (bonding) or is attaching equipment to the earth (ground) the use of the terminology becomes consistent and much clearer. The proposed change is radical, but if usability is to be achieved, changes like this will have to be made to correct many years of poor Code writing that has evolved to this state. The panel should continue to accept this proposal as indicated in the panel action and substantiated in the panel statement. See also the comments made for proposal 5-1.

SKUGGEVIG: See my Comment on Affirmative on Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".

WHITE: I reference my affirmative comment for Proposal 5-1. Acceptance of this proposal will eliminate other occurrences throughout Article 250 where the terms "grounded" and "bonded" have been used interchangeably. It is imperative that terminology be consistently applied in the NEC.

5-45 Log #3158 NEC-P05Meeting Action: Accept **Final Action: Reject**
(250)

TCC Action: Reject

It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" to correlate with the action of the Technical Correlating Committee on Proposal 5-1.

Submitter: Eric Stromberg, The Dow Chemical Company

Recommendation:

Consider replacing "Equipment Grounding Conductor" with "Equipment Bonding Conductor".

Substantiation:

Currently, the word "Grounding" has multiple definitions within Article 250. Grounding is defined in the beginning of the article as being for the purpose of stabilizing the system voltages and giving them a reference to the Earth. Bonding is defined as providing a Low Impedance Fault Path that connects noncurrent carrying metal parts of the system together for the clearing of overcurrent protection devices in the event of a phase to case fault. The equipment grounding conductor is clearly for the purpose of clearing overcurrent protection and should be referred to as an equipment bonding conductor.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 11 Negative: 5

Explanation of Negative:

BOKSINER: See my Explanation of Negative Vote on Proposal 5-1.
BRETT: See my Explanation of Negative Vote on Proposals 5-1 and 5-41.
HAMMEL: See my Explanation of Negative Vote on Proposal 5-1.
RAPPAPORT: See my Explanation of Negative Vote on Proposal 5-1.
STEINMAN: See my Explanation of Negative Vote on Proposal 5-1.

Comment on Affirmative:

SKUGGEVIG: See my Comment on Affirmative on Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".

5-37 Log #1529 NEC-P05 **Final Action: Accept**
(250, and 250.1)

TCC Action:

The Technical Correlating Committee advises that Article Title and Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee "Accepts" the Panel Action.

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise the title of Article 250 as follows:
Article 250 Grounding <u>and Bonding</u>
I. general
250.1 Scope.
This article covers general requirements for grounding and bonding of electrical installations, and specific requirements in (1) through (6)
(1) Systems, circuits, and equipment required, permitted, or not permitted to be grounded
(2) Circuit conductor to be grounded on grounded systems
(3) Location of grounding connections
(4) Types and sizes of grounding and bonding conductors and electrodes
(5) Methods of grounding and bonding
(6) Conditions under which guards, isolation, or insulation may be substituted for grounding

Substantiation:

The scope of the article clearly indicates that the Article covers both Ground and Bonding requirements. Adding the term "bonding" to the title of the article is appropriate and is consistent with the scope and the fact that there are generally as many bonding requirements and provisions included within Article 250 as there are grounding requirements, if not more.

Panel Meeting Action: Accept

Panel Statement:

The panel understands that the TCC has jurisdiction with all changes to title and scope of Article 250.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON: The inclusion of the term "and bonding" in the title of the article is consistent with the statements in the scope of the article. Bonding is a primary performance function addressed in the article even more frequently than grounding. Both words in the title appear to be appropriate. This action is also consistent with the consensus, comments, and action of Panel 5 at the ROP hearings in January 2003.
WHITE: See my Comment on Affirmaive on Proposal 5-1.

5-46 Log #3041 NEC-P05 **Final Action: Reject**
(250-2–Bonding Jumper (separately derived system) (New))

Submitter: Robert J. Kelleher, State of New Jersey Electrical Subcode Official

Recommendation:

Add the following new definition: Bonding Jumper (separately derived system). The connection between the grounded circuit conductor and the equipment grounding conductors of the separately derived system.

Substantiation:

Most users do not understand the importance of the bonding jumper as used in 250.30. The addition of the separately derived system bonding jumper will make this more user friendly. See submitted proposal to 250.30.

Panel Meeting Action: Reject

Panel Statement:

The terms bonding jumper and separately derived system are already defined in Article 100. Panel 5 concludes that a separate definition in Article 250 is not needed.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-47 Log #2764 NEC-P05 **Final Action: Accept in Principle**
(250-2–Effective Ground-Fault Current Path)

Submitter: Douglas Hansen, Codecheck

Recommendation:

Revise definition of Effective Ground-Fault Current Path in Section 250.2 by adding seven words at the end as follows:
Effective Ground-Fault Current Path. An intentionally constructed, permanent, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground fault on a wiring system to the electrical supply source to facilitate the operation of overcurrent devices.

Substantiation:

Sections 250.4(A)(3), (4) and (5) provide performance requirements for the ground-fault current path for grounded systems. This proposal clarifies that the purpose of an effective path is to facilitate the overcurrent protection device. Section 250.4(B)(4) states that bonding of ungrounded systems is intended to facilitate operation of overcurrent devices when a second fault occurs. This proposal brings 250.4(A) dealing with grounded systems into conformity with this concept.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 5-48 (Log #2955).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER: This proposal inserts a "purpose" within a definition. A purpose is NOT a definition.
The last seven words (not underlined as instructed for NEC proposals) do not belong here.
I believe this is a violation of 2.2.2 of the NEC style manual.

5-48 Log #2955 NEC-P05 **Final Action: Accept in Principle**
(250-2–Effective Ground-Fault Current Path)

Submitter: Charles Mello, Electro-Test, Inc.

Recommendation:

Revise the definition of "effective ground fault current path with an addition at the end as follows:
Effective Ground-Fault Current Path. An intentionally constructed, permanent, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground on a wiring system to the electrical supply source and facilitate the operation of the overcurrent protection.

Substantiation:

The basis for these definitions was from the Fine Print Note that were part of the 1996 NEC 250-1 and that became part of the 1999 rewrite as text in 250.2. When the text revisions were made, the concept of the impedance path being low enough to allow sufficient current to flow so the overcurrent device operated was lost. The revised test brings that back in and wherever this term is used, the concept of protection provided by the overcurrent device is provided.

Panel Meeting Action: Accept in Principle

Revise the definition of "effective ground fault current path with an addition at the end as follows:
Effective Ground-Fault Current Path. An intentionally constructed, permanent, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground on a wiring system to the electrical supply source and facilitates the operation of the overcurrent protective device or ground detectors on high-impedance grounded systems.

Panel Statement:

The term "facilitate" was made plural to correct the grammar. Additional text was added to include high-impedance grounded systems.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER: See my Explanation of Negative Vote on Proposal 5-47.

Comment on Affirmative:

JOHNSTON: I concur with the insertion of the proposed wording "facilitating the operation of the overcurrent device" that helps clarify the purpose and further explains the performance aspects of this section from a functional perspective.

5-49 Log #2648 NEC-P05 **Final Action: Accept**
(250-2–Ground Fault)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Revise the definition of "Ground Fault" as follows:
Ground Fault. An unintentional, electrically conducting connection between an ungrounded or grounded conductor of an electrical circuit and the normally non–current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment, or earth.

Substantiation:

An unintentional electrically conducting connection of the grounded conductor needs to be included in the definition of "ground fault." This will coordinate with Section 110.7 on Insulation Integrity and Section 250.24(A)(5) Load-Side Grounding Connections.
Basically, grounded conductors are required to be grounded in accordance with Article 250. A ground fault of the grounded conductor can cause GFCI protective devices to operate and render ground-fault protection of equipment to be inoperative.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON: I concur with the insertion of the proposed wording that helps clarify the purpose and further explains the performance aspects of this section from a functional perspective.

5-50 Log #2765 NEC-P05 **Final Action: Accept in Principle**
(250-2–Ground Fault)

Submitter: Douglas Hansen, Codecheck

Recommendation:

Revise to read as follows:
Ground Fault. An unintentional, electrically conducting connection between conductor(s) of an electrical circuit that are intended to carry current and the normally non-current carrying conductors, metallic enclosures, metallic raceways, metallic equipment, or earth.

Substantiation:

The proposal deletes the words "an ungrounded" and replaces them with the term "that are intended to carry current." The present wording does not recognize a connection between a grounded neutral conductor and a grounding conductor. GFCI and GFPE devices are intended to open when such a ground fault occurs, and this proposal makes the definition consistent with actual product design.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 5-49 (Log #2648). The panel concludes that this meets the intent of the submitter.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-51 Log #1650 NEC-P05 **Final Action: Accept**
(250-3)

Submitter: Richard J. Buschart, Cable Tray Institute / Rep. NEMA

Recommendation:

Add after Cablebus:

Insert Table Here

(Table shown on page 2725)

Substantiation:

Article 392, Sections 392.3 and 392.7 address particular cases of installation of conductors and equipment beyond Article 250.

Panel Meeting Action: Accept

Editorially correct reference to 392.3(C).

Panel Statement:

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-52 Log #1557 NEC-P05 **Final Action: Accept in Principle**
(250-4(A)(5))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.4(A)(5) as follows:
(5) Effective Ground-Fault Current Path. Electrical equipment and wiring and other electrically conductive material likely to become energized shall be installed in a manner that creates a permanent, low-impedance circuit capable of safely carrying the maximum ground-fault current likely to be imposed on it from any point on the wiring system where a ground fault may occur to the electrical supply source. The earth shall not be used as an ~~the sole equipment grounding conductor o~~r effective ground-fault current path.

Substantiation:

The revision is needed to remove the term "sole equipment grounding conductor" from this performance provision in Article 250. The earth should not be used at all as an equipment grounding conductor. The revision enhances what is intended by these requirements. By removing the reference and relation to the equipment grounding conductor and earth from this section, should help in understanding and proper application of these performance requirements. It is understood that the earth will be in the grounding circuit and is a high impedance path in the grounding circuit. It should be clarified even further that the equipment grounding conductor is an intentionally constructed effective ground-fault current path and the earth is not and never should be considered as such whether the sole path or otherwise.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:
250.4(A)(5) Effective Ground-Fault Current Path. Electrical equipment and wiring and other electrically conductive material likely to become energized shall be installed in a manner that creates a permanent, low-impedance circuit facilitating the operation of the overcurrent device or ground detector for high-impedance grounded systems. It shall be capable of safely carrying the maximum ground-fault current likely to be imposed on it from any point on the wiring system where a ground fault may occur to the electrical supply source. The earth shall not be considered as an effective ground-fault current path.

Panel Statement:

The revised text incorporates the input from Proposal 5-53 (Log #2958). The panel concludes the revised text meets the intent of the submitters.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON: This proposal is consistent with clarifying performance functions of the "effective ground-fault current path" and also removes the term "sole equipment grounding conductor" from this section to further emphasize that the earth shall not be used as a sole equipment grounding conductor path or otherwise.

5-53 Log #2958 NEC-P05 **Final Action: Accept in Principle**
(250-4(A)(5))

Submitter: Charles Mello, Electro-Test, Inc.

Recommendation:

Revise the text as follows:
(5) Effective Ground-Fault Current Path. Electrical equipment and wiring and other electrically conductive material likely to become energized shall be installed in a manner that creates a permanent, low-impedance circuit facilitating the operation of the overcurrent device and capable of safely carrying the maximum ground-fault current likely to be imposed on it from any point on the wiring system where a ground fault may occur to the electrical supply source. The earth shall not be used as the sole equipment grounding conductor or effective ground-fault current path.

Substantiation:

The additional wording reinstates the concept of facilitating the operation of the overcurrent device that was lost in the 1999 and 2002 revisions process.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 5-52 (Log #1557).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER: The added words are not a definition. See my Explanation of Negative Vote on Proposal 5-47 which is similar.

Comment on Affirmative:

JOHNSTON: I concur with the insertion of the proposed wording "facilitating the operation of the overcurrent device" that helps clarify the purpose and further explains the performance aspects of this section from a functional perspective.
RAPPAPORT: My notes indicate that the reference in the Panel Statement should be to Proposal 5-48 which introduces the phrase "facilitating the operation of the overcurrent device".

5-54 Log #1558 NEC-P05 **Final Action: Accept in Principle**
(250-4(B)(4))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.4(B)(4) as follows:

(4) Path for Fault Current. Electrical equipment, wiring, and other electrically conductive material likely to become energized shall be installed in a manner that creates a permanent, low-impedance circuit from any point on the wiring system to the electrical supply source to facilitate the operation of overcurrent devices should a second fault occur on the wiring system. The earth shall not be used as an ~~the sole equipment grounding conductor or~~ effective fault-current path.

Substantiation:

The revision is needed to remove the term "sole equipment grounding conductor" from this performance provision in Article 250. The earth should not be used at all as an equipment grounding conductor. The revision enhances what is intended by these requirements. By removing the reference and relation to the equipment grounding conductor and earth from this section, should help in understanding and proper application of these performance requirements. It is understood that the earth will be in the grounding circuit and is a high impedance path in the grounding circuit. It should be clarified even further that the equipment grounding conductor is an intentionally constructed effective fault current path and the earth is not and never should be considered as such whether the sole path or otherwise.

Panel Meeting Action: Accept in Principle

Revise the last sentence to read as follows:

"The earth shall not be considered as an effective fault-current path."

Panel Statement:

The revised wording adds clarity.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: The Panel Action is not consistent with the Panel Action on Proposal 5-52 where the term "ground-fault current" is used rather than the term "fault current" in this Panel Action.

Comment on Affirmative:

JOHNSTON: See affirmative statement to the action of the panel on proposal 5-52.

5-55 Log #178 NEC-P05 **Final Action: Reject**
(250-6, FPN (New))

Submitter: Peter VandeMotter, BLM Engineers Inc.

Recommendation:

Add the following new text:
FPN: Currents used to operate motion sensors, photocells timers and related controls, limited to 15 mA are not considered objectionable currents.

Substantiation:

Clarification that the grounding conductor may be used to carry such return current. This has been the practice for several years, but has not been specifically permitted by the Code.

Panel Meeting Action: Reject

Panel Statement:

There is no substantiation to add this FPN.
Setting a value in a fine print note is a requirement that violates the NEC Style manual.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

BOKSINER: The NEC is not the appropriate document for defining values of "objectionable" current. The appropriate documents for specifying allowable current flows on grounding conductors are the relevant product standards that can take into account specific installation conditions. Current flow on grounding conductors is not necessarily hazardous in all cases. For example, it is not hazardous under any of the following conditions:
(1) The supply voltage is below hazardous levels for normal conditions of contact (i.e., SELV or ELV as defined by IEC),
(2) There is a multiplicity of grounding conductors, so that an interruption of any single conductor does not affect the open-circuit voltage at the equipment enclosure, or
(3) The conditions of maintenance and supervision are such that opening of the equipment grounding conductor is not likely to occur.
In addition, currents on equipment grounding conductors emanate from equipment that does not require permits to be installed in many cases, so product standards offer the best means for providing requirements on equipment grounding conductor currents.
MELLO: The panel has spent much time to ensure the present language and requirements keep the equipment grounding (bonding) conductor as a normally non-current carrying conductor. The only current to be allowed is that which is induced by capacitive coupling and cannot be controlled unless the laws of physics were changed. What is proposed actually presents a potentially very hazardous condition. Even though, as the submitter states, there are only a few milliamps, opening of the equipment grounding (bonding) circuit at any point between the proposed equipment connection and the source would have a potential of the system phase-to-ground voltage which could be lethal. There is no substitute for doing the wiring properly and if a grounded conductor (neutral) is not present, then rewiring to provide one is the only correct action to be taken. The panel should continue to reject this proposal.
RAPPAPORT: I believe that the Panel Statement should have been more positive in emphasizing that the use of the grounding conductor for an intentional circuit return path, regardless of the current level, is not permitted and intended to be permitted in the Code. Depending upon the source impedance of these small currents, they could be hazardous to personnel.

5-56 Log #1219 NEC-P05 **Final Action: Reject**
(250-8)

Submitter: Wayne H. Robinson, Prince George County Government

Recommendation:

Add text to read as follows:
250.8 Connection of Grounding and Bonding Equipment. Grounding electrode conductors, grounding conductors and bonding jumpers shall be connected by exothermic welding, listed pressure connectors, listed clamps or other listed means.

Substantiation:

To add consistency and clarity with the rewording of grounding conductor as a grounding electrode conductor in Section 250.64(E) and 250.32(E).

Panel Meeting Action: Reject

Panel Statement:

The term "grounding electrode conductor" is already included in the definition of "grounding conductors".

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-57 Log #1569 NEC-P05 **Final Action: Accept in Principle**
(250-8)

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.8 as follows:
250.8 Connection of Grounding and Bonding Equipment.
Grounding conductors and bonding jumpers shall be connected by exothermic welding, listed pressure connectors, listed clamps, or other listed means. Connection devices or fittings that depend solely on solder shall not be used. Sheet metal screws shall not be used to connect terminals or grounding conductors to enclosures.

Substantiation:

This revision should help clarify that terminals for grounding conductors or bonding jumpers are required to be attached to enclosures in a suitable method to ensure effective contact and pressure between the terminal and enclosure. The present wording only addresses conductors between a screw and the enclosure and does not address terminals and lugs that are secured to the enclosure to which grounding or bonding conductors would terminate. This connection is in the ground fault current path and must be effective based on the language in 250.4(A)(5) and 250.4(B)(4). Sheet metal screws may not provide the required effective path from the conductor to the enclosure. Also the general requirements of 250.90 which states: "Bonding shall be provided where necessary to ensure electrical continuity and the capacity to conduct safely any fault current likely to be imposed."

Panel Meeting Action: Accept in Principle

Revise Section 250.8 as follows:
250.8 Connection of Grounding and Bonding Equipment.
Grounding conductors and bonding jumpers shall be connected by exothermic welding, listed pressure connectors, listed clamps, or other listed means. Connection devices or fittings that depend solely on solder shall not be used. Sheet metal screws shall not be used to connect grounding conductors or connection devices to enclosures.

Panel Statement:

This added text meets the intent of the submitter.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

DOBROWSKY: This section needs to be expanded to include more of the requirements applicable to grounding and bonding. Specific provisions contained in various sections such as 250.30, 250.64 and 250.70 should be removed and inserted here. The concern for nonirreversibility and integrity of connections should not be different whether the installation is a service, separately derived system or grounding or bonding conductor. Equipment that is listed and evaluated according to the product standard for grounding and bonding equipment should be acceptable for use without further restrictions.
JOHNSTON: The proposed addition of the term "or connection devices" clarifies the intent of the Panel that the sheet metal screws used in this manner for this purpose create a weak link in the effective fault current path. The acceptance of the change closes this hole and provides clearer direction and guidance for the installer and the inspector.

5-58 Log #2468 NEC-P05 **Final Action: Accept**
(250-20, Part II and 250.20)

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
II. ~~Circuit and~~ System Grounding
250.20 Alternating-Current ~~Circuits and Systems~~ to Be Grounded.
Alternating-current ~~circuits and~~ systems shall be grounded as provided for in 250.20(A), (B), (C), or (D). Other ~~circuits and~~ systems shall be permitted to be grounded. If such systems are grounded, they shall comply with the applicable provisions of this article.
FPN: An example of a system permitted to be grounded is a corner-grounded delta transformer connection. See 250.26(4) for conductor to be grounded.
(A) Alternating-Current ~~Circuits~~ Systems of Less than 50 Volts. Alternating-current ~~circuits~~ systems of less than 50 volts shall be grounded under any of the following conditions:
(1) Where supplied by transformers, if the transformer supply system exceeds 150 volts to ground
(2) Where supplied by transformers, if the transformer supply system is ungrounded
(3) Where installed as overhead conductors outside of buildings

Substantiation:

If a circuit is grounded, the system supplying it becomes grounded. Deleting the term circuit makes the concept easier to understand.

Panel Meeting Action: Accept

Editorially correct title of 250.20 to read "Alternating-Current Systems To Be Grounded"

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-59 Log #2469 NEC-P05 **Final Action: Accept in Principle**
(250-20(E) (New))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Add a new subdivision as follows:
(E) High-impedance grounded systems shall be grounded in accordance with 250.36.

Substantiation:

Impedance grounded systems are not ungrounded, they just have some of the benefits. They are still connected to earth but through an impedance device.

Panel Meeting Action: Accept in Principle

Revise the Proposal to read:
"Impedance Grounded Neutral Systems. Impedance grounded neutral systems shall be grounded in accordance with 250.36 or 250.186."

Panel Statement:

Editorial correction to add a title for the proposed new section and to recognize the requirements of 250.186.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-60 Log #1542 NEC-P05 **Final Action: Reject**
(250-21)

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Add text to read as follows:
250.21 Alternating-Current Systems of 50 Volts to 1000 Volts Not Required to Be Grounded.
The following ac systems of 50 volts to 1000 volts shall be permitted to be grounded but shall not be required to be grounded:
(1) Electric systems used exclusively to supply industrial electric furnaces for melting, refining, tempering, and the like
(2) Separately derived systems used exclusively for rectifiers that supply only adjustable-speed industrial drives
(3) Separately derived systems supplied by transformers that have a primary voltage rating less than 1000 volts, provided that all the following conditions are met:
a. The system is used exclusively for control circuits.
b. The conditions of maintenance and supervision ensure that only qualified persons service the installation.
c. Continuity of control power is required.
d. Ground detectors are installed on the control system.
(4) High-impedance grounded neutral systems as specified in 250.36
(5) Other systems that are not required to be grounded in accordance with the requirements of 250.20(B).
Where an alternating – current system is not grounded as permitted in 250.21(1) through (5), ground detectors shall be installed on the system.
Exception: Systems of less than 120 volts to ground as permitted by this Code shall not be required to have ground detectors.

Substantiation:

This change would be consistent with industry practices when ungrounded systems are installed for continuity of service and minimizing downtime. The Code already requires these detectors for ungrounded control circuits and high impedance grounded neutral systems. The revision would ensure that there would be a warning of a first phase-to-ground fault on ungrounded systems so it could be corrected prior to the second phase to ground fault occurring. If undetected, the benefits of the ungrounded system (continuity of service and minimizing outages) are uncertain and safety for persons and property is compromised by the effects of a second phase-to-ground fault on such systems.

Panel Meeting Action: Reject

Panel Statement:

There are many ungrounded systems installed around the country. The submitter has provided no substantiation or existing problems that would make this requirement necessary to mandate. Designers and building owners are not restricted from this option.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

HAMMEL: The benefits of using ground detectors on ungrounded systems are recognized throughout industry. The safety of persons working on ungrounded systems with an undetected fault is compromised. Ground detectors should be required on ungrounded systems.

5-61 Log #2470 NEC-P05 **Final Action: Accept**
(250-21(5))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Delete subdivision (5).

Substantiation:

High impedance systems are grounded, the connection is through a grounding impedance. This proposal correlates with one submitted to 250.20 to add the provisions there.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-62 Log #2471 NEC-P05 **Final Action: Reject**
(250-21(6) (New))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Add a new subdivision as follows:
(6) The frames of generators and vehicles in accordance with 250.34.

Substantiation:

This proposal correlates with a proposal submitted to 250.34. The generator and vehicle frame are not grounded (connected to earth).

Panel Meeting Action: Reject

Panel Statement:

In accordance with 250.34 the frame of a portable or vehicle mounted generator is "ground" for the purposes of that system. The definitions of ground and grounded indicate a connection to earth (the dirt) or some conducting body that serves in place of the earth. This is a case where a conducting body, the generator frame, serves in place of the earth so the system is in fact grounded. To add this item would be confusing to users. There is not a requirement to connect the frame to the earth (the dirt) since the frame acts in its place but that is not to say the generator system can be "ungrounded" as permitted in 250.21.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

DOBROWSKY: The proposal should be accepted and additionally the term "Grounded", in Article 100, should be modified to remove the phrase "or some conducting body that serves in place of the earth." The generator frame does not actually serve in place of the earth. Using the present concept causes significant confusion in the industry.

5-62a Log #CP507 NEC-P05 **Final Action: Accept**
(250.22)

Submitter: Code-Making Panel 5

Recommendation:

Revise 250.22 to read as follows:
250.22 Circuits Not to Be Grounded.
The following circuits shall not be grounded:
(1) ~~Cranes (~~circuits for electric cranes operating over combustible fibers in Class III locations, as provided in 503.13~~)~~
(2) circuits in health ~~Health~~ care facilities ~~(circuits~~ as provided i~~n Article 517~~)~~-~~517.61 and 517.160
(3) circuits for equipment within electrolytic cell working zone ~~Electrolytic cells (circuits~~ as provided in ~~Article 668~~) 668.20(B)
(4) secondary circuits of lighting ~~Lighting~~ systems [~~secondary circuits operating at 30 volts or less~~ as provided in 411.5(A)].

Substantiation:

The panel revised general references to specific references as required by NEC Style Manual 4.1.1

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-63 Log #2354 NEC-P05 **Final Action: Reject**
(250-24)

Submitter: Travis Moser, Dakota Electric Construction

Recommendation:

Add the following text:
Grounded conductor shall be routed with the phase conductors and shall not be smaller than the largest phase conductor.

Substantiation:

Grounded conductor may be sized too small by using the recommended table.

Panel Meeting Action: Reject

Panel Statement:

There is no technical substantiation to demonstrate that the grounded conductors sized per 250.24 are inadequate.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-64 Log #3164 NEC-P05 **Final Action: Reject**
(250-24(A))

Submitter: Eric Stromberg, The Dow Chemical Company

Recommendation:

At the end of the sentence add the following: and sized per 250.66

Substantiation:

Although the application of Tables 250.66 and 250.122 is obvious for students of the code, it represents a common point of confusion for many in the electrical business. References to the proper table will go a long way in clearing up this issue.

Panel Meeting Action: Reject

Panel Statement:

Section 250.24(A) covers system grounding connections. Although grounding electrode conductor is mentioned in this section, the sizing requirements are already included in 250.66 in Part III of the Article.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-65 Log #1370 NEC-P05 **Final Action: Accept in Principle in Part**
(250-24(A)(3)through 250.32)

Submitter: Jon Farren, Farren Engineering, Inc.

Recommendation:

Revise text in the following paragraphs to reduce misinterpretation and to provide clarification:

250.24(A)(3) Dual Fed Services. For services that are dual fed (double ended) in a common enclosure or grouped together in separate enclosures and employing a secondary tie, a single grounding electrode connection to the tie point of the grounded ~~circuit~~ service conductors from each power source shall be permitted.

250.24(A)(5) Load-Side Grounding Connections. A grounding connection shall not be made to any grounded ~~circuit~~ conductor on the load side of the service disconnecting means except as otherwise permitted in this article.

250.24(B)(1) Routing and Sizing. ...The grounded service ~~entrance~~ conductor of a 3-phase, 3-wire delta service shall have an ampacity not less than the ungrounded conductors.

250.28 Main Bonding Jumper. For a grounded system, an unspliced main bonding jumper shall be used to connect the equipment grounding conductor(s) and the service disconnect enclosure to the grounded system conductor ~~of the system~~ within the enclosure for each service disconnect.

250.30(A)(1) Bonding Jumper. A bonding jumper in compliance with 250.28(A) through (D) that is sized for the derived phase conductors shall be used to connect the equipment grounding conductors of the separately derived system to the grounded conductor of the separately derived system. Except as permitted by...

250.30(A)(2) Exception: A grounded electrode conductor shall not be required for a system that supplies a Class 1, Class 2 or Class 3 circuit and is derived from a transformer rated not more than 1000 volt-amperes, provided the ~~system~~ grounded conductor of the separately derived system is bonded to the transformer frame...

250.32(B)(2) Grounded Conductor. ...and (3) ground-fault protection of equipment has not been installed on the common ac service, the grounded ~~circuit~~ conductor run with the supply to the building or structure shall be connected...

250.32(D)(1) The connection of the grounded ~~circuit~~ conductor to the grounding electrode at a separate building or structure shall not be made.

Substantiation:

Consistent terminology reduces confusion and misinterpretation.

The adjectives (service, system or circuit) will help clarify. As is already done in paragraphs 250.24(A), 250.24(A)(1), 250.24(A)(2), 250.24(C), 250.30 Exception No. 1, 250.102(D).

Deleting the adjectives (service, system or circuit) indicates the requirement applies to all types of grounded conductors.

Proposed modifications to 250.24(A)(5) because this applies to "feeders" as well as "circuits".

Proposed modifications to 250.30(A)(2) are consistent with the text used in 250.30(A)(3).

Proposed modifications to 250.32 because this applies to "feeders" as well as "circuits".

Panel Meeting Action: Accept in Principle in Part

The panel actions are as follows:

(1) Revise 250.24(A)(3) to read:

Dual Fed Services. For services that are dual fed (double ended) in a common enclosure or grouped together in separate enclosures and employing a secondary tie, a single grounding electrode connection to the tie point of the grounded ~~circuit~~ conductor(s) from each power source shall be permitted.

(2) Revise 250.24(A)(5) to read:

Load-Side Grounding Connections. A grounding connection shall not be made to any grounded ~~circuit~~ conductor on the load side of the service disconnecting means except as otherwise permitted in this article.

(3) Revise 250.24(B)(1) to read:

Routing and Sizing. This conductor shall be routed with the phase conductors and shall not be smaller than the required grounding electrode conductor specified in Table 250.66 but shall not be required to be larger than the largest ungrounded service-entrance phase conductor. In addition, for service-entrance phase conductors larger than 1100 kcmil copper or 1750 kcmil aluminum, the grounded conductor shall not be smaller than 12.5 percent of the area of the largest service-entrance phase conductor. The grounded ~~service entrance~~ conductor of a 3-phase, 3-wire delta service shall have an ampacity not less than the ungrounded conductors.

(4) Revise 250.28 by deleting the words "of the system".

(5) The panel rejects the proposed revision to 250.30(A)(1).

(6) Revise 250.30(A)(1)Exception No.1 to read:

A bonding jumper at both the source and the first disconnecting means shall be permitted where doing so does not establish a parallel path for the grounded ~~circuit~~ conductor. Where a grounded conductor is used in this manner, it shall not be smaller than the size specified for the bonding jumper but shall not be required to be larger than the ungrounded conductor(s). For the purposes of this exception, connection through the earth shall not be considered as providing a parallel path.

(7) Revise 250.30(A)(2) Exception to read:,

Exception: A grounding electrode conductor shall not be required for a system that supplies a Class 1, Class 2, or Class 3 circuit and is derived from a transformer rated not more than 1000 volt-amperes, provided the ~~system~~ grounded conductor is bonded to the transformer frame or enclosure by a jumper sized in accordance with 250.30(A)(1), Exception No. 2, and the transformer frame or enclosure is grounded by one of the means specified in 250.134.

(8) Revise 250.32(B)(2) to read:

Grounded Conductor. Where (1) an equipment grounding conductor is not run with the supply to the building or structure, (2) there are no continuous metallic paths bonded to the grounding system in both buildings or structures involved, and (3) ground-fault protection of equipment has not been installed on the common ac service, the grounded ~~circuit~~ conductor run with the supply to the building or structure shall be connected to the building or structure disconnecting means and to the grounding electrode(s) and shall be used for grounding or bonding of equipment, structures, or frames required to be grounded or bonded. The size of the grounded conductor shall not be smaller than the larger of

(1) That required by 220.22
(2) That required by 250.122
(9) Revise 250.32(D)(1) to read:
The connection of the grounded ~~circuit~~ conductor to the grounding electrode at a separate building or structure shall not be made.

Panel Statement:

The panel requests NFPA to review the policy regarding a proposal to multiple sections of the Code. Each proposal should be to a single section. Any proposal that does not meet this guideline should automatically be rejected.

To provide the consistency substantiated by the submitter and to use only defined terminology, the term "grounded conductor" without any additional modifiers provides the clarity intended by the submitter.

(1) Deleted the proposed addition of "service" and changed the plural "conductors" to the dual singular and plural "conductor(s)". This removed the modifier from the "grounded conductor".
(2) Accepted change as proposed.
(3) Deleted the modifier "service" in addition to the proposed deletion of "entrance". Renumbered to be consistent with panel action on Proposal 5-69 (Log #2473).
(4) See panel action and statement Proposals 5-69 (Log #2473) and 5-74 (Log #2474). The panel concludes the revised text meets the intent of the submitter.
(5)The panel rejected the proposed action. The proposed text does not add clarity.
(6) The panel revised the text in the exception for consistency.
(7) See the panel action and statement Proposal 5-78 (Log #1725). The panel concludes the revised text meets the intent of the submitter.
(8) Accepted change as proposed.
(9) Accepted change as proposed.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

MELLO: There is a typographical error in the panel action revised text. In line item 3 for 250.24(B)(1) the area is specified as "12 percent" and it should be "12 1/2 percent"

5-66 Log #166 NEC-P05 **Final Action: Reject**
(250-24(A)(4))

TCC Action:

It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 4 for information.

Submitter: L. L. Buie, Jr., Pettit & Pettit, Consulting Engineers Inc.

Recommendation:

Delete existing text and add the following new text:
(4) Main bonding jumper shall be wire or busbar installed from the neutral bar or bus to the line side of the utility ground fault protector and from the equipment bar or bus to the load side of the utility ground fault protector. The grounding electrode conductor shall be connected to the equipment grounding terminal.

Substantiation:

This proposal is needed only if utility ground fault protector is added in Section 230.96 proposal.

Panel Meeting Action: Reject

It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 4 for information.

Panel Statement:

The submitter has provided no technical substantiation documenting the need for this change. The present requirement in 250.28 requires the main bonding jumper to be unspliced.

CMP-5 requests that the Technical Correlating Committee send this Proposal to CMP-4 for comment.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-67 Log #1543 NEC-P05 **Final Action: Accept in Principle**
(250-24(A)(4))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise 250.24(A)(4) as follows:
250.24 Grounding Service-Supplied Alternating-Current Systems.
(A) System Grounding Connections. A premises wiring system supplied by a grounded ac service shall have a grounding electrode conductor connected to the grounded service conductor, at each service, in accordance with 250.24(A)(1) through (A)(5).....
(4) Main Bonding Jumper as Wire or Busbar. Where the main bonding jumper specified in 250.28 is a wire or busbar and is installed from the grounded conductor terminal ~~neutral~~ bar or bus to the equipment grounding terminal bar or bus in the service equipment, the grounding electrode conductor shall be permitted to be connected to the equipment grounding terminal bar or bus to which the main bonding jumper is connected.

Substantiation:

The provision in 250.24(A)(5) should be applicable to all grounded conductors not just grounded conductors that are also neutral conductors.

Panel Meeting Action: Accept in Principle

Revise 250.24(A)(4) as follows:
250.24 Grounding Service-Supplied Alternating-Current Systems.
(A) System Grounding Connections. A premises wiring system supplied by a grounded ac service shall have a grounding electrode conductor connected to the grounded service conductor, at each service, in accordance with 250.24(A)(1) through (A)(5).....
(4) Main Bonding Jumper as Wire or Busbar. Where the main bonding jumper specified in 250.28 is a wire or busbar and is installed from the grounded conductor terminal, ~~neutral~~ bar, or bus to the equipment grounding terminal, bar, or bus in the service equipment, the grounding electrode conductor shall be permitted to be connected to the equipment grounding terminal, bar, or bus to which the main bonding jumper is connected.

Panel Statement:

Added commas in three locations to make it clear that a terminal, bar, or bus includes lugs.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-68 Log #2472 NEC-P05 **Final Action: Reject**
(250-24(B))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
(B) Grounded Conductor Brought to Service Equipment. Where an ac system operating at less than 1000 volts is grounded at any point, the grounded conductor(s) shall be run to each service disconnecting means and shall be bonded to each disconnecting means enclosure. The grounded conductor(s) shall be installed in accordance with 250.24(B)(1) through (B)(3).
Exception 1: Where an equipment bonding conductor, installed in accordance with 250.24(B)(1) through (B)(3), bonds each service disconnecting means to the system grounding point the grounded conductor shall not be required.
~~Exception~~ Exception 2: Where more than one service disconnecting means are located in assembly listed for use as service equipment, it shall be permitted to run the grounded conductor(s) or equipment bonding jumper(s) to the assembly, and the conductor(s) shall be bonded to the assembly enclosure.

Substantiation:

Where no line-to-neutral loads are served, the conductor installed is more appropriately called a bonding conductor since it does not normally carry current. The term bonding conductor was chosen because its length is similar to that of the line conductors. This proposal does not delete or modify the remaining "subdivisions" [(1) through (3)].

Panel Meeting Action: Reject

Panel Statement:

Accepting this proposal would result in an unsafe condition as the grounded conductor in an ac system must be run with the phase conductors to provide a low-impedance path for fault current to return to the source. The grounded conductor must be at the service to connect the grounding electrode and the main bonding jumper to the service in accordance with 250.24(A).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

DOBROWSKY: The proposal should be accepted in principle and an exception added to prohibit a main bonding jumper if the provisions of this proposed exception are used. If a path for fault current is provided by means other than a grounded conductor, such as a suitable metal raceway, then a grounded conductor should not be required.

5-69 Log #2473 NEC-P05 **Final Action: Accept in Principle**
(250-24(B) (New))

TCC Action:

See the Technical Correlating Committee note on Proposal 5-1.

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Insert the following and re-letter the remaining subdivisions:
(B) Main Bonding Jumper. For a grounded system, an unspliced main bonding jumper shall be used to connect the equipment grounding conductor(s) and the service-disconnect enclosure to the grounded conductor of the system within the enclosure for each service disconnect.
Exception No. 1: Where more than one service disconnecting means is located in an assembly listed for use as service equipment, an unspliced main bonding jumper shall bond the grounded conductor(s) to the assembly enclosure.
Exception No. 2: Impedance grounded neutral systems shall be permitted to be connected as provided in 250.36 and 250.186.

Substantiation:

The bonding requirement for services are more appropriate in this section. This with the modification of 250.28 improves clarity to differentiate between service and system bonding. The bonding requirements for separately derived systems are already contained in that section. Impedance grounded systems are covered by 250.30(A)(6)(c).

Panel Meeting Action: Accept in Principle

Insert the proposed text as a new section to read as follows:
250.24(B) Main Bonding Jumper. For a grounded system, an unspliced main bonding jumper shall be used to connect the equipment bonding conductor(s) and the service-disconnect enclosure to the grounded conductor of the system within the enclosure for each service disconnect in accordance with 250.28.
Exception No. 1: Where more than one service disconnecting means is located in an assembly listed for use as service equipment, an unspliced main bonding jumper shall bond the grounded conductor(s) to the assembly enclosure.
Exception No. 2: Impedance grounded neutral systems shall be permitted to be connected as provided in 250.36 and 250.186.
Note: Renumber the succeeding sections.

Panel Statement:

The revised text establishes the requirement in the service grounding section but directs the specifics of the installation to 250.28 which covers both services and separately derived systems. See panel action and statement proposal 5-73 (Log #1544). The panel believes the revised text meets the intent of the submitter.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

MELLO: The panel statement has an incorrect reference to proposal 5-73 (log 1544) when it should be proposal 5-74 (log 2474).

5-70 Log #2609 NEC-P05 **Final Action: Reject**
(250-24(B)(1))

Submitter: E. “Bud” Griffy, III, Bass & Associates Inc. Electrical & Mechanical Consultants

Recommendation:

Revise text to read as follows:
This conductor shall be routed with the phase conductors and shall not be smaller than ~~the required grounding electrode conductor specified in Table 250.166 but shall not be required to be larger than the largest ungrounded service-entrance conductor. In addition, for service-entrance conductors larger than 1100 kcmil copper or 1750 kcmil aluminum, the grounded conductor shall not be smaller than 12 1/2~~ 100-percent of the area of the largest ungrounded service-entrance phase conductor. ~~The Grounded Service Entrance conductor of a 3-phase, 3-wire delta service shall have an ampacity not less than the ungrounded conductors.~~

Substantiation:

[Text of Proposal 5-70 substantiation is shown on page 2609]

Panel Meeting Action: Reject

Panel Statement:

Insufficient substantiation was provided by the submitter to prohibit a reduction in size of grounded conductors as currently allowed by a minimum provisions in the Code. The submitter also appears to give the implication that the main bonding jumper is too small also. These are both sized in similar fashion as they work cooperatively in fault conditions.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-71 Log #2346 NEC-P05 **Final Action: Reject**
(250-24(B)(2))

Submitter: Blair Fauske, Dakota Electric Construction Company / Rep. IBEW LU 1426

Recommendation:

Where the service-entrance phase conductors are installed in parallel, the size of the grounded conductor shall not be smaller than the ungrounded conductors in each pipe.

Substantiation:

If sized by recommended table the ungrounded conductor seems to be sized too small.

Panel Meeting Action: Reject

Panel Statement:

The technical substantiation does not support a change or the premise the present requirements are always inadequate. There is no technical substantiation to demonstrate that the grounded conductors sized per 250.24 are inadequate. There were no citations of specific cases where the grounded conductor sized per 250.24 has failed in service. The NEC is a minimum standard and if engineering judgment or known system conditions warrant, exceeding the minimum Code requirements is then required.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-72 Log #164 NEC-P05 **Final Action: Reject**
(250-28)

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-making Panel 4 for information.

Submitter: L. L. Buie, Jr., Pettit & Pettit, Consulting Engineers Inc.

Recommendation:

Delete existing text and add the following text:
250.28 Main Bonding Jumper. For a grounded system, a main bonding jumper shall be used to connect the equipment ground bar or bus to the load side of the utility ground fault protector and to connect the neutral bar or bus to the line side of the utility ground fault protector.

Substantiation:

This proposal is needed only if utility ground fault protector is added in Section 230.96 proposal.

Panel Meeting Action: Reject

Panel Statement:

The submitter has provided no technical substantiation documenting the need for this change. The present requirement in 250.28 requires the main bonding jumper to be unspliced.

CMP-5 requests that the Technical Correlating Committee send this Proposal to CMP-4 for comment.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-73 Log #1544 NEC-P05 **Final Action: Reject**
(250-28)

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.28 as follows:
250.28 Main Bonding Jumper.
For a grounded system or service, an unspliced main bonding jumper shall be used to connect the equipment grounding conductor(s) ~~and~~ to the ~~service disconnect enclosure to the~~ grounded conductor of the service or system at one the following locations:
(1) within the enclosure for each service disconnect
(2) within the separately derived system source enclosure, or the first system disconnecting means or enclosure for separately derived system in accordance with 250.30(A)(1).

Substantiation:

This is a companion proposal to work cooperatively with the proposed revision to Section 250.30(A)(1).

Panel Meeting Action: Reject

Panel Statement:

The proposed text is in conflict with 250.30(A)(1) and removes the allowance for bonding the seperately derived system between the source and the first disconnecting means.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-74 Log #2474 NEC-P05 **Final Action: Accept in Principle**
(250-28)

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:

250.28 Main Bonding ~~Jumper~~ Jumpers and Systems Bonding Jumpers. For a grounded system main bonding jumpers and systems shall be installed as follows: ~~For a grounded system, an unspliced main bonding jumper shall be used to connect the equipment grounding conductor(s) and the service disconnect enclosure to the grounded conductor of the system within the enclosure for each service disconnect.~~

~~Exception No. 1: Where more than one service disconnecting means is located in an assembly listed for use as service equipment, an unspliced main bonding jumper shall bond the grounded conductor(s) to the assembly enclosure.~~

~~Exception No. 2: Impedance grounded neutral systems shall be permitted to be connected as provided in 250.36 and 250.186.~~

(A) Material. Main bonding jumpers and system bonding jumpers shall be of copper or other corrosion-resistant material. A main bonding jumper and a system bonding jumper shall be a wire, bus, screw, or similar suitable conductor.

(B) Construction. Where a main bonding jumper or a system bonding jumpers is a screw only, the screw shall be identified with a green finish that shall be visible with the screw installed.

(C) Attachment. Main bonding jumpers and system bonding jumpers shall be attached in the manner specified by the applicable provisions of 250.8.

(D) Size. ~~The main~~ Main bonding ~~jumper~~ jumpers and system bonding jumpers shall not be smaller than the sizes shown in Table 250.66 ~~for grounding electrode conductors~~. Where the ~~service entrance phase~~ supply conductors are larger than 1100 kcmil copper or 1750 kcmil aluminum, the bonding jumper shall have an area that is not less than 12 1/2 percent of the area of the largest phase conductor except that, where the phase conductors and the bonding jumper are of different materials (copper or aluminum), the minimum size of the bonding jumper shall be based on the assumed use of phase conductors of the same material as the bonding jumper and with an ampacity equivalent to that of the installed phase conductors.

Substantiation:

The term system bonding jumper is being introduced to clarify the requirements between service and separately derived systems. A proposal has been submitted to Article 100 to add the following definition.

Bonding Jumper, System. The connection between the grounded circuit conductor and the equipment ~~grounding~~ bonding conductor at ~~at the serviced~~ a separately derived system.

This proposal provides an alternative approach to changing the existing definition of a "main bonding jumper" to make it applicable whether it is at the service or not. There may be some merit for restricting the existing term to services. At a service the "main" bonding jumper provides a connection to the grounded conductor to complete the path for fault current. At a separately derived system, where bonding is accomplished at the source (secondary) the path may be directly connected to the secondary winding (XO). Services are supplied from systems. The legislative text is to show the changes from the existing definition (main bonding jumper) and changes from other proposals. The first paragraph and exceptions are added to 240.24 in another proposal.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

250.28 Main Bonding Jumper and System Bonding Jumper. For a grounded system, main bonding jumpers and system bonding jumpers shall be installed as follows: ~~For a grounded system, an unspliced main bonding jumper shall be used to connect the equipment grounding conductor(s) and the service disconnect enclosure to the grounded conductor of the system within the enclosure for each service disconnect.~~

~~Exception No. 1: Where more than one service disconnecting means is located in an assembly listed for use as service equipment, an unspliced main bonding jumper shall bond the grounded conductor(s) to the assembly enclosure.~~

~~Exception No. 2: Impedance grounded neutral systems shall be permitted to be connected as provided in 250.36 and 250.186.~~

(A) Material. Main bonding jumpers and system bonding jumpers shall be of copper or other corrosion-resistant material. A main bonding jumper and a system bonding jumper shall be a wire, bus, screw, or similar suitable conductor.

(B) Construction. Where a main bonding jumper or a system bonding jumper is a screw only, the screw shall be identified with a green finish that shall be visible with the screw installed.

(C) Attachment. Main bonding jumpers and system bonding jumpers shall be attached in the manner specified by the applicable provisions of 250.8.

(D) Size. ~~The main~~ Main bonding ~~jumper~~ jumpers and system bonding jumpers shall not be smaller than the sizes shown in Table 250.66 ~~for grounding electrode conductors~~. Where the ~~service entrance phase~~ supply conductors are larger than 1100 kcmil copper or 1750 kcmil aluminum, the bonding jumper shall have an area that is not less than 12 1/2 percent of the area of the largest phase conductor except that, where the phase conductors and the bonding jumper are of different materials (copper or aluminum), the minimum size of the bonding jumper shall be based on the assumed use of phase conductors of the same material as the bonding jumper and with an ampacity equivalent to that of the installed phase conductors.

Panel Statement:

The panel made various editorial corrections.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

MELLO: I agree with all the proposed changes except the addition of the term "system bonding Jumper". There is no need to add the term "system bonding jumper" which is the same thing as the "main bonding jumper" by its very use in this section. Adding terminology like this only adds to the confusion and misunderstanding that the panel is trying to clear up. From the standpoint of the connection between the equipment grounding conductor(s), possibly the grounding electrode conductor and the system grounded conductor (neutral) there is no technical difference between a "service" or a "separately derived system". Both are sources of power for supplying the premises wiring system that happens to be served by that system. In today's deregulated utility world the "service" is at best a moving target. Utilities are selling parts of their existing systems to owners whereby the "service" just became a "separately

best a moving target. Utilities are selling parts of their exiting systems to owners whereby the "service" just became a "separately derived system" and as far as this conductor is concerned nothing changed in terms of form, function, application, duty, withstand etc. Conversely there are owners, like several universities, that are now selling their primary distribution to the local utility thereby instantly making many "separately derived systems" into "services". Again, regarding the connection between the neutral and the equipment grounding system, there is no difference in form or function. The correct action for the panel is to change the definition of "main bonding jumper" in article 100 to reflect the real world application of this connection. There is a proposal to do exactly this, which CMP 5 will have the opportunity to comment on. See also comments on proposals 5-78, 5-80, 5-83 and 5-103.

5-75 Log #168 NEC-P05 **Final Action: Reject**
(250-28(A))

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-making Panel 4 for information.

Submitter: L. L. Buie, Jr., Pettit & Pettit, Consulting Engineers Inc.

Recommendation:

Revise text to read as follows:
(A) Material. Main bonding jumpers shall be of copper or other corrosion-resistant material. A main bonding jumper shall be a wire, bus, ~~screw~~, or similar suitable conductor.

Substantiation:

This proposal is needed only if utility ground fault protector is added in Section 230.96 proposal.

Panel Meeting Action: Reject

Panel Statement:

The submitter has provided no technical substantiation documenting the need for this change. There is no substantiation to delete the permission to use a screw as the main bonding jumper as permitted in this section. The present requirement in 250.28 requires the main bonding jumper to be unspliced.
CMP-5 requests that the Technical Correlating Committee send this Proposal to CMP-4 for comment.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-76 Log #165 NEC-P05 **Final Action: Reject**
(250-28(B))

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-making Panel 4 for information.

Submitter: L. L. Buie, Jr., Pettit & Pettit, Consulting Engineers Inc.

Recommendation:

Delete Paragraph B in its entirety.

Substantiation:

This proposal is needed only if utility ground fault protector is added in Section 230.96 proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 5-75 (Log #168).
CMP-5 requests that the Technical Correlating Committee send this Proposal to CMP-4 for comment.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-260 Log #2608 NEC-P05 **Final Action: Reject**
(250-28(D))

Submitter: E. "Bud" Griffy, III, Bass & Associates Inc. Electrical & Mechanical Consultants

Recommendation:

Revise text to read as follows:

The main bonding jumper shall not be smaller than ~~the sizes shown in Table 250.66 for grounding electrode conductors. Where the service-entrance conductors larger than 1100 kcmil copper or 1750 kcmil aluminum, the bonding jumper shall have an area that is not less than 12-1/2~~ 100-percent of the area of the largest service-entrance phase conductor except that, where the phase conductors and the bonding jumper are of different materials (copper or aluminum) the minimum size of the bonding jumper shall be based on the assumed use of the same material as the bonding jumper and with an ampacity equivalent to that of the installed phase conductors. Where the Main Bonding Jumper is a part of a factory provided Switchboard or Panelboard, the 100-percent requirement will be satisfied, if: 1) The factory provided Main Bonding Jumper is the same size and material as the largest ungrounded phase bus installed. 2) For Panelboards, a Ground-Bus is provided of the same size, and is 1-inch long per 100 amperes, up to a 12-inches maximum requirement, and is intimately bonded to the Service enclosure, 3) For switchboards, a Ground-Bus is extended the full length of the Switchboard, and intimately bonded to each horizontal section the Switchboard enclosure.

Substantiation:

[Text of Proposal 5-260 substantiation is shown on page 2307]

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 5-70 (Log #2609).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-77 Log #2715 NEC-P05 **Final Action: Reject**
(250-28(D))

Submitter: Dale Rooney, Municipality of Anchorage

Recommendation:

Add new last sentence to read - "Where the service entrance conductors consist of nine or more parallel runs, the main bonding jumper shall be permitted to be installed as parallel conductors not smaller than 1/0."

Substantiation:

Paralleling of the main bonding jumper is not currently addressed in the NEC. It should be permitted where the main bonding jumper would be required to be larger than the individual service entrance conductors.

Panel Meeting Action: Reject

Panel Statement:

The submitter has provided no substantiation for the proposed change. The proposal does not appear to even address a main bonding jumper at all, but appears to be intended to apply to equipment bonding jumpers. There are already rules that cover the methods of installation and sizing equipment bonding jumpers contained within Article 250. Supply side equipment bonding jumper installation and sizing are currently included in 250.102(C), which includes requirements for parallel installations for equipment bonding jumpers.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

MELLO: The panel should continue to reject this proposal. The panel statement is incorrect in that the proposal and the substantiation are addressing the "main bonding jumper". The submitter was establishing an installation condition whereby paralleling of the main bonding jumper would be permitted and was not addressing line side equipment bonding jumpers. There is no prohibition from installing the main bonding jumper using parallel conductors and this in fact has been a common practice where conductors are used instead of busbar on large service rated switchboards for many years. Section 310-4 does not apply in any way since it only applies to ungrounded conductors, grounded conductors and equipment grounding conductors.

5-78 Log #1725 NEC-P05 (250-30) **Final Action: Accept in Principle**

TCC Action:

See the Technical Correlating Committee note on Proposal 5-1.

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise and reorganize Section 250.30 as follows:

250.30 Grounding Separately Derived Alternating-Current Systems.

(A) Grounded Systems. A separately derived ac system that is grounded shall comply with ~~250.30(A)~~(1) through (8) ~~(6)~~. A grounding connection shall not be made to any grounded circuit conductor on the load side of the point of grounding of the separately derived system except as otherwise permitted in this article.

FPN: See 250.32 for connections at separate buildings or structures, and 250.142 for use of the grounded circuit conductor for grounding equipment.

Exception: ~~High~~ Impedance grounded neutral system grounding connections ~~requirements shall not be required to comply with 250.30(A)(1) and (2) and~~ shall be made as specified in 250.36 or ~~and~~ 250.186.

(1) Bonding Jumper. A bonding jumper in compliance with 250.28(A) through (D) that is sized based on ~~for~~ the derived phase conductors shall be used to connect the equipment grounding conductors of the separately derived system to the grounded conductor. ~~Except as permitted by 250.24(A)(3),~~ This connection shall be made at any point on the separately derived system from the source to the first system disconnecting means or overcurrent device, or it shall be made at the source of a separately derived system that has no disconnecting means or overcurrent devices. ~~The point of connection shall be the same as the grounding electrode conductor as required in 250.30(A)(3)(2).~~

Exception No. 1: For separately derived systems that are dual fed (double ended) in a common enclosure or grouped together in separate enclosures and employing a secondary tie, a single bonding jumper connection to the tie point of the grounded circuit conductors from each power source shall be permitted.

Exception No. 2 ~~1~~: A bonding jumper at both the source and the first disconnecting means shall be permitted where doing so does not establish a parallel path for the grounded circuit conductor. Where a grounded conductor is used in this manner, it shall not be smaller than the size specified for the bonding jumper but shall not be required to be larger than the ungrounded conductor(s). For the purposes of this exception, connection through the earth shall not be considered as providing a parallel path.

Exception No. 3 ~~2~~: The size of the bonding jumper for a system that supplies a Class 1, Class 2, or Class 3 circuit, and is derived from a transformer rated not more than 1000 volt-amperes, shall not be smaller than the derived phase conductors and shall not be smaller than 14 AWG copper or 12 AWG aluminum.

(2) Equipment Bonding Jumper Size. Where a bonding jumper of the wire type is run with the derived phase conductors from the source of a separately derived system to the first disconnecting means, it shall be sized in accordance with 250.102(C), based on the size of the derived phase conductors.

~~(2)~~ Grounding Electrode Conductor. The grounding electrode conductor shall be installed in accordance with (a) or (b). Where taps are connected to a common grounding electrode conductor, the installation shall comply with 250.30(A)(3).

(3) ~~(a)~~ Grounding Electrode Conductor, Single Separately Derived System. A grounding electrode conductor for a single separately derived system shall be sized in accordance with 250.66 for the derived phase conductors and shall be used to connect the grounded conductor of the derived system to the grounding electrode as specified in 250.30(A)(7)~~(4)~~. ~~Except as permitted by 250.24(A)(3) or (A)(4)~~, This connection shall be made at the same point on the separately derived system where the bonding jumper is installed.

Exception No. 1: Where the bonding jumper specified in 250.30(A)(1) is a wire or busbar, it shall be permitted to connect the grounding electrode conductor to the equipment grounding terminal bar or bus provided the equipment grounding terminal bar or bus is of sufficient size for the separately derived system.

Exception No. 2: A grounding electrode conductor shall not be required for a system that supplies a Class 1, Class 2, or Class 3 circuit and is derived from a transformer rated not more than 1000 volt-amperes, provided the system grounded conductor is bonded to the transformer frame or enclosure by a jumper sized in accordance with 250.30(A)(1), Exception No. 3 ~~2,~~ and the transformer frame or enclosure is grounded by one of the means specified in 250.134.

(4) ~~(b)~~ Grounding Electrode Conductor, Multiple Separately Derived Systems. Where more than one separately derived system is connected to a common grounding electrode conductor ~~as provided in 250.30(A)(3)~~, the common grounding electrode conductor shall be sized in accordance with 250.66, based on the sum of the ~~total~~ circular mil area of the largest derived phase conductor(s) from each separately derived system connected to the common grounding electrode conductor.

(a) ~~(3)~~ Grounding Electrode Conductor Taps. Where more than one separately derived system is

installed, it shall be permissible to connect a taps from each a separately derived system to a common grounding electrode conductor. Each tap conductor shall connect the grounded conductor of the separately derived system to the common grounding electrode conductor.

Exception No. 1: Where the bonding jumper specified in 250.30(A)(1) is a wire or busbar, it shall be permitted to connect the grounding electrode conductor to the equipment grounding terminal bar or bus provided the equipment grounding terminal bar or bus is of sufficient size for the separately derived system.

Exception No. 2: A grounding electrode conductor shall not be required for a system that supplies a Class 1, Class 2, or Class 3 circuit and is derived from a transformer rated not more than 1000 volt-amperes, provided the system grounded conductor is bonded to the transformer frame or enclosure by a jumper sized in accordance with 250.30(A)(1), Exception No. 3 and the transformer frame or enclosure is grounded by one of the means specified in 250.134.

(b) ~~(a)~~ Tap Conductor Size. Each tap conductor shall be sized in accordance with 250.66 based on ~~for~~ the derived phase conductors of the separately derived system it serves.

(c) ~~(b)~~ Connections. All tap connections to the common grounding electrode conductor shall be made at an accessible location by a listed connector, an irreversible compression connector listed for the purpose, listed connections to copper busbars not less than 6 mm x 50 mm (1/2 in. x 2 in.), or by the exothermic welding process. The tap conductors shall be connected to the common grounding electrode conductor ~~as specified in 250.30(A)(2)(b)~~ in such a manner that the common grounding electrode conductor remains without a splice or joint.

(5) ~~(c)~~ Installation. The common grounding electrode conductor and the taps to each separately derived system shall comply with 250.64(A), (B), (C), and (E).

(6) ~~(d)~~ Bonding. ~~Where exposed~~ Structural steel t~~hat is interconnected to form the building frame and or interior metal piping exists in the area served by the separately derived system, it~~ shall be bonded to the grounding electrode conductor in accordance with 250.104.

(7) ~~(4)~~ Grounding Electrode. The grounding electrode shall be as near as practicable to and preferably in the same area as the grounding electrode conductor connection to the system. The grounding electrode shall be the nearest one of the following:

(1) An effectively grounded metal water pipe grounding electrode as specified in 250.52(A)(1)

(2) An effectively grounded structural metal grounding electrode as specified in 250.52(A)(2) ~~member of the structure~~

~~(2) An effectively grounded metal water pipe within 1.5 m (5 ft) from the point of entrance into the building~~

Exception: In industrial and commercial buildings where conditions of maintenance and supervision ensure that only qualified persons service the installation and the entire length of the interior metal water pipe that is being used for the grounding electrode is exposed, the connection shall be permitted at any point on the water pipe system.

Exception No. 1: ~~(3)~~ Any of the other electrodes identified in ~~as specified by~~ 250.52(A) shall be used where the electrodes specified by 250.30(A)(7)~~(4)(1) or (A)(4)(2)~~ are not available

Exception No. 2 ~~3~~ to (1) and (2), ~~and (3)~~: Where a separately derived system originates in listed equipment suitable for use as service equipment, the grounding electrode used for the service or feeder shall be permitted as the grounding electrode for the separately derived system, provided the grounding electrode conductor from the service or feeder to the grounding electrode is of sufficient size for the separately derived system. Where the equipment ground bus internal to the service equipment is not smaller than the required grounding electrode conductor, the grounding electrode connection for the separately derived system shall be permitted to be made to the bus.

FPN: See 250.104(A)(4) for bonding requirements of interior metal water piping in the area served by separately derived systems.

~~**(5) Equipment Bonding Jumper Size.** Where a bonding jumper is run with the derived phase conductors from the source of a separately derived system to the first disconnecting means, it shall be sized in accordance with 250.28(A) through (D), based on the size of the derived phase conductors.~~

(8) ~~(6)~~ Grounded Conductor. Where a grounded conductor is installed and the bonding jumper is not located at the source of the separately derived system, the following shall apply:

(a) Routing and Sizing. This conductor shall be routed with the derived phase conductors and shall not be smaller than the required grounding electrode conductor specified in Table 250.66, but shall not be required to be larger than the largest ungrounded derived phase conductor. In addition, for phase conductors larger than 1100 kcmil copper or 1750 kcmil aluminum, the grounded conductor shall not be smaller than 12 1/2 percent of the area of the largest derived phase conductor. The grounded conductor of a 3-phase, 3-wire delta system shall have an ampacity not less than the ungrounded conductors.

(b) Parallel Conductors. Where the derived phase conductors are installed in parallel, the size of the grounded conductor shall be based on the total circular mil area of the parallel conductors as indicated in this section. Where installed in two or more raceways, the size of the grounded conductor in each raceway shall be based on the size of the ungrounded conductors in the raceway but not smaller than 1/0 AWG.

FPN: See 310.4 for grounded conductors connected in parallel.

(c) ~~High~~ Impedance Grounded System. The grounded conductor of an ~~on a high~~-impedance grounded neutral system shall be installed ~~grounded~~ in accordance with 250.36 or 250.186.

Substantiation:

This proposal incorporates the work of a task group to address editorial and technical clarifications to Section 250.30.

250.30(A)(5) was relocated to 250.30(A)(2). The reference to 250.28 for sizing was changed to reference Section 250.102(C) to address sizing the equipment bonding jumpers are installed in parallel in individual raceways.

250.30(A)(3)(b) was relocated to 250.30(A)(4)(c). This section was also revised to be consistent with the permitted methods of connection allowed by Section 250.64(D) for grounding electrode conductor taps.

Section 250.30(A)(4) was relocated to Section 250.30(A)(7). Section 250.30(A)(7) items (1) and (2) were revised to refer to the grounding electrodes permitted for grounding that are specified in 250.52(A). The term or concept of grounding electrodes that are "effectively grounded" is already included in 250.52(A). The previous 250.30(A)(4) Exception No. 1 is no longer needed because it already follows Section 250.52(A)(1).

The balance of the changes are editorial to improve clarity. The task group felt that the section needed to be reorganized to provide a more logical layout. The revisions clearly address grounding electrode conductor(s) single separately derived systems and the common grounding electrode conductor concept for multiple separately derived systems as separate provisions.

Table includes proposal CMP-05 Task Group activity summary and cross reference.

Insert NEC Tb 250-30 L1725 here

(Table shown on page 2725)

Task group members include: Paul Dobrowsky, Chuck Mello, J. Philip Simmons, and Mike Johnston.

Panel Meeting Action: Accept in Principle

Revise Section 250.30 to read as follows:

[Text of Proposal 5-78 committee action is shown on page 2302]

Panel Statement:

This panel action includes actions taken on this Proposal and Proposals 5-1 (Log #2453e), 5-65 (Log #1370), 5-79 (Log #2305), 5-80 (Log #2475), 5-82 (Log #2960), 5-83 (Log #1546), 5-84 (Log #3042), 5-93 (Log #3163), 5-97 (Log #1551), 5-100 (Log #359), 5-101 (Log #358), 5-102 (Log #1552) and 5-103 (Log #1553). The balance of the changes are editorial to improve clarity. The Task Group determined that the section needed to be reorganized to provide a more logical layout.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

RAPPAPORT: I would vote Affirmative to the reorganization except for two items. In 250.30(A)(1), the term "equipment bonding conductor" is not acceptable. See my Explanation of Negative Vote on Proposal 5-1.

In 250.30(A)(4), the fixed size of #3/0 is not acceptable. The purpose of the grounding electrode conductor within a building when supplied from a service or other separately derived system is to stabilize the voltage and minimize transient overvoltages. The other purposes of a grounding electrode conductor such as to limit voltage due to lightning or contact with higher voltage systems do not exist in the above situation. Stabilizing the voltage can be adequately accomplished by sizing the grounding electrode conductor for the single largest separately derived system.

STEINMAN: The use of the term "common grounding electrode conductor" is not defined in the NEC. Tap connections to the grounding electrode conductor are required to be made with permanent type connections; irreversible compression-type or exothermic welding. According to 250.30(C) of this proposal, the use of any Listed connector may be used as a tap. This is not only a major change in the permanence of this connection, it also lowers the safety level of this connection without any technical substantiation. This proposal will allow a connector that has not been evaluated to a fault current test to be installed as a tap. This connection is relied upon during lightning and ground faults, and high, short time currents are induced upon this connection. UL467, Grounding and Bonding Equipment, evaluates connectors for high current conditions. The elimination of the permanence of this connection was not substantiated.

Comment on Affirmative:

DOBROWSKY: The proposal should not have been modified to include the minimum 3/0 conductor size for a common grounding electrode. There are many installations where multiple transformers can be installed using a considerably smaller common grounding electrode conductor. Requiring a 3/0 conductor for all multiple transformers installations is not necessary and does not have adequate substantiation.

MELLO: I agree with all the proposed changes except the addition of the term "system bonding Jumper". There is no need to add the term "system bonding jumper" which is the same thing as the "main bonding jumper" by its very use in this section. Adding terminology like this only adds to the confusion and misunderstanding that the panel is trying to clear up. From the standpoint of the connection between the equipment grounding conductor(s), possibly the grounding electrode conductor and the system grounded conductor (neutral) there is no technical difference between a "service" or a "separately derived system". Both are sources of power for

supplying the premises wiring system that happens to be served by that system. In today's deregulated utility world the "service" is at best a moving target. Utilities are selling parts of their exiting systems to owners whereby the "service" just became a "separately derived system" and as far as this conductor is concerned nothing changed in terms of form, function, application, duty, withstand etc. Conversely there are owners, like several universities, that are now selling their primary distribution to the local utility thereby instantly making many "separately derived systems" into "services". Again, regarding the connection between the neutral and the equipment grounding system, there is no difference in form or function. The correct action for the panel is to change the definition of "main bonding jumper" in article 100 to reflect the real world application of this connection. There is a proposal to do exactly this, which CMP 5 will have the opportunity to comment on. See also comments on proposals 5-74, 5-80, 5-83 and 5-103.

ROBERTSON: Proposal 5-93 submitted by Frederic P. Harwell wanted to require a minimum size 3/0 AWG copper or 250 kcmil aluminum grounding electrode conductor be installed where more than one separately derived system is connected to it.

The panel action was to accept in principle with a panel statement to see panel action on proposal 5-78.

250.30(A)(2)(b) rewrite as accepted by the panel only requires the common grounding electrode conductor shall be sized in accordance with 250.66, based on the sum of the circular mil area of the largest derived phase conductor(s) from each separately derived system connected to the common grounding electrode conductor.

I agree with the Panel's effort to correct an obvious problem in current code language, however, I do not feel we accomplished that goal. Therefore, I am voting Affirmative with Comment.

The current wording is a major problem and the proposed wording is a partial fix. This section needs to be rewritten to leave no doubt that it is the Panel's intent that the common grounding electrode conductor be sufficiently sized to serve all separately derived systems to be connected to it. If that number is unknown, then the common grounding electrode conductor should be sized as Mr. Hartwell suggested. A 3/0 AWG copper or 250 kcmil aluminum.

Example:

A Spec. Building of 12 floors is built. On floors 1, 4, 7 and 10, a small transformer and house panel are to be installed to serve common areas. These transformers, basen on proposed wording for the 2005 code cycle, require a 1/0 AWG copper common grounding electrode.

So a 1/0 AWG copper conductor is installed. As the building is leased, transformer after transformer is installed to serve tenant spaces. This could and probably will result in the 1/0 AWG common grounding electrode conductor being undersized even though it met the requirements of 250.30(A)(2)(b) when installed.

In this example, it is apparent a 3/0 AWG common grounding electrode conductor should have been installed.

But why would we want to require the 3/0 AWG common grounding electrode conductor in an installation where there would never be additional transformers added and the 1/0 AWG common grounding electrode conductor is of sufficient size?

5-79 Log #2305 NEC-P05 (250-30) **Final Action: Accept in Principle**

TCC Action:

See the Technical Correlating Committee note on Proposal 5-1.

Submitter: Michael J. Johnston, International Association of Electrical Inspectors

Recommendation:

[Text of Proposal 5-79 recommendation is shown on page 2304]

Substantiation:

This proposal incorporates the work of a task group to address editorial and technical clarifications to Section 250.30.

250.30(A)(5) was relocated to 250.30(A)(2). The reference to 250.28 for sizing was changed to reference Section 250.102(C) to address sizing the equipment bonding jumpers that are installed in parallel in individual raceways.

250.30(A)(3)(b) was relocated to 250.30(A)(4)(c). This section was also revised to be consistent with the permitted methods of connection allowed by Section 250.64(D) for grounding electrode conductor taps.

Section 250.30(A)(4) was relocated to Section 250.30(A)(7). Section 250.30(A)(7) items (1) and (2) were revised to refer to the grounding electrodes permitted for grounding that are specified in 250.52(A). The term or concept of grounding electrodes that are "effectively grounded" is already included in 250.52(A). The previous 250.30(A)( ) Exception No. 1 is no longer needed because it already follows Section 250.52(A)(1).

Other changes are intended to be editorial to improve clarity. The task group felt that the section needed to be reorganized to provide a more logical layout. The revisions clearly address grounding electrode conductor(s) for single separately derived systems and the common grounding electrode conductor concept for multiple separately derived systems as separate provisions.

The following table includes a cross reference for revised numbering in the Task Group proposal.

*****Insert Table Log 2305 Here ****

(Table shown on page 2726)

Panel Meeting Action: Accept in Principle

The action for this proposal has been incorporated into the panel action of Proposal 5-78 (Log #1725).

Panel Statement:

See panel action and statement on Proposal 5-78 (Log #1725).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: See my Explanation of Negative on Proposal 5-78.

5-80 Log #2475 NEC-P05 **Final Action: Accept in Principle**
(250-30)

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Change "bonding jumper" to "system bonding jumper" throughout the section and in other submitted proposals.

Substantiation:

This proposal correlates with the proposal to revise 250.28. The term "system bonding jumper" is being introduced to clarify the requirements between services and separately derived systems. A proposal has been submitted to Article 100 to add a new definition.

Panel Meeting Action: Accept in Principle

The action for this proposal has been incorporated into the panel action of Proposal 5-78 (Log #1725).

Panel Statement:

See panel action and statement on Proposal 5-78 (Log #1725).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: There is no need to create this term "system bonding jumper" which is the same thing as the "main bonding jumper" by its very use in this application. Adding terminology like this only adds to the confusion and misunderstanding that the panel is trying to clear up. From the standpoint of the connection between the equipment grounding conductor(s), possibly the grounding electrode conductor and the system grounded conductor (neutral) there is no technical difference between a "service" or a "separately derived system". Both are sources of power for supplying the premises wiring system that happens to be served by that system. If there is such a critical difference then the panel should also change the name of the "grounding electrode conductor" which typically does serve a slightly different purpose in separately derived systems than it does for a service. To do that is not warranted just as calling this conductor anything other than a "main bonding jumper" is not technically warranted. In today's deregulated utility world the "service" is at best a moving target. Utilities are selling parts of their exiting systems to owners whereby the "service" instantly is transformed into a "separately derived system" and as far as this conductor is concerned nothing changed in terms of form, function, application, duty, withstand etc. Conversely there are owners, like several universities, that are now selling their primary distribution to the local utility thereby instantly making many "separately derived systems" into "services". Again, regarding the connection between the neutral and the equipment grounding system, there is no difference in form or function, so why the need for a different term? The correct action for the panel is to change the definition of "main bonding jumper" in article 100 to reflect the real world application of this connection. There is a proposal to do exactly this, which CMP 5 will have the opportunity to comment on. See also comments on proposals 5-74, 5-78, 5-83 and 5-103.

5-81 Log #2072 NEC-P05 **Final Action: Reject**
(250-30(4)(2))

Submitter: Mark T. Rochon, City of Salem Electrical Department

Recommendation:

Add text to read as follows:
(2) An effectively grounded metal water pipe unit 1.5 m (5 ft) from the point of entrance into the building <u>on the street side of the water main shut off</u>.

Substantiation:

Plumbers are disconnecting the grounding electrode when replacing water main shut off, and not connecting them back up, also possible electrocution is possible if the plumbers get caught between the connection.

Panel Meeting Action: Reject

Panel Statement:

Submitter has not provided adequate substantiation for the change. It appears to be an isolated condition. Section 250.52(A)(2) recognizes water pipe in contact with the earth for 3.0 m (10 ft) or more. This piping can be on the street side of the water meter or on the customer side. There are provisions for a bonding jumper with adequate length installed around such fittings where removal of the jumper is not needed for persons working on the water piping system and might require removal of the meter or other fitting. Section 250.68(B) addresses this situation.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-82 Log #2960 NEC-P05 **Final Action: Accept in Part**
(250-30(A) Exception No. 1, 2, and 3)

Submitter: Charles Mello, Electro-Test, Inc.

Recommendation:

Revise the text and relocate from below 250.30(A)(4) to the appropriate location under 250.30(A)(3):

Exception to (1), (2), and (3): Where a separately derived system ~~originates~~ source and derived system is completely contained within ~~in~~ listed equipment suitable for use as service equipment, the grounding electrode conductor used for the service or feeder shall be permitted as the grounding electrode conductor for the separately derived system, provided the grounding electrode conductor from the service or feeder to the grounding electrode is of sufficient size for the separately derived system. Where the equipment ground bus internal to the ~~service~~ equipment is not smaller than the required grounding electrode conductor, the grounding electrode conductor connection for the separately derived system shall be permitted to be made to the bus.

Substantiation:

This exception is identified as being an exception to parts 1, 2 and 3 yet it is located under section 4, which deals with a different topic. The revised wording makes it clear that grounding electrodes do not have a size specificatio but that the grounding electrode conductor must be sized to meet the requirements of both systems, the service or feeder as well as the separately derived system.

Panel Meeting Action: Accept in Part

The panel only accepts the deletion of the word "service". All other changes in the recommendation are not accepted. The action for this proposal has been incorporated into the panel action of Proposal 5-78 (Log #1725).

Panel Statement:

Proposed changes (other than the deletion of service) are not accepted because they do not provide clarity. The word connection implies there is a conductor and is not necessary. See panel action and statement on Proposal 5-78 (Log #1725).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: This proposal should have been accepted in principle as a minimum. The present text does not make sense as it reads nor is it in the correct location. The present text talks about the size of the grounding electrode – there are no sizes provided for grounding electrodes based on derived conductors. The text also states that if the grounding electrode used for the supply side is adequately sized, then it is permitted to be used for the derived side. 250.50 is very clear that any building or structure is allowed to have only one grounding electrode system, but this incorrect language, would lead one to believe that you could have two independent electrodes, one for the supply and one for the separately derived system. This exception belongs under the grounding electrode conductor provisions as an exception and not under the grounding electrode part. The common item that is to be sized and possibly used for both the service or feeder at a second building and the derived system that is created within the listed equipment assembly is the grounding electrode conductor. The term "conductor" should be added as shown in three locations.

5-83 Log #1546 NEC-P05 **Final Action: Accept in Principle**
(250-30(A)(1))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.30(A)(1) as follows:
(1) Main Bonding Jumper. An unspliced system main bonding jumper in compliance with 250.28(A) through (D) that is sized for the derived phase conductors shall be used to connect the equipment grounding conductors of the separately derived system to the grounded conductor. Except as permitted by 250.24(A)(3), this connection shall be made at any point on the separately derived system from the source to the first system disconnecting means or overcurrent device, or it shall be made at the source of a separately derived system that has no disconnecting means or overcurrent devices. The point of connection shall be the same as the grounding electrode conductor as required in 250.30(A)(2).
Exception No. 1: A system main bonding jumper at both the source and the first disconnecting means shall be permitted where doing so does not establish a parallel path for the grounded circuit conductor. Where a grounded conductor is used in this manner, it shall not be smaller than the size specified for the bonding jumper but shall not be required to be larger than the ungrounded conductor(s). For the purposes of this exception, connection through the earth shall not be considered as providing a parallel path.
Exception No. 2: The size of the system main bonding jumper for a system that supplies a Class 1, Class 2, or Class 3 circuit, and is derived from a transformer rated not more than 1000 volt-amperes, shall not be smaller than the derived phase conductors and shall not be smaller than 14 AWG copper or 12 AWG aluminum.

Substantiation:

This revision is a companion proposal that revises this section to be consistent with the definition of "Bonding Jumper. Main".

Panel Meeting Action: Accept in Principle

Delete the word "main" in (4) instances in the recommendation. Add the word "system" to the title. The action for this proposal has been incorporated into the panel action of Proposal 5-78 (Log #1725).

Panel Statement:

The term main in this application does not apply. See panel action and statement on Proposal 5-78 (Log #1725).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: There is no need to create this term "system bonding jumper" which is the same thing as the "main bonding jumper" by its very use in this application. Adding terminology like this only adds to the confusion and misunderstanding that the panel is trying to clear up. From the standpoint of the connection between the equipment grounding conductor(s), possibly the grounding electrode conductor and the system grounded conductor (neutral) there is no technical difference between a "service" or a "separately derived system". Both are sources of power for supplying the premises wiring system that happens to be served by that system. If there is such a critical difference, then the panel should also change the name of the "grounding electrode conductor" which typically does serve a slightly different purpose in separately derived systems than it does for a service. To do that is not warranted just as calling this conductor anything other than a "main bonding jumper" is not technically warranted. In today's deregulated utility world the "service" is at best a moving target. Utilities are selling parts of their exiting systems to owners whereby the "service" instantly is transformed into a "separately derived system" and as far as this conductor is concerned nothing changed in terms of form, function, application, duty, withstand etc. Conversely there are owners, like several universities, that are now selling their primary distribution to the local utility thereby instantly making many "separately derived systems" into "services". Again, regarding the connection between the neutral and the equipment grounding system, there is no difference in form or function, so why the need for a different term? The correct action for the panel is to change the definition of "main bonding jumper" in article 100 to reflect the real world application of this connection. There is a proposal to do exactly this, which CMP 5 will have the opportunity to comment on. See also comments on proposals 5-74, 5-78, 5-80 and 5-103. The panel action should be accept in principle and delete the term "system" and leave the term "main".

5-84 Log #3042 NEC-P05 **Final Action: Accept in Principle**
(250-30(A)(1))

Submitter: Robert J. Kelleher, State of New Jersey Electrical Subcode Official

Recommendation:

Revise text as follows:
~~250.30(A)(1) Bonding Jumper.~~
250.30(A)(1) Separately Derived System Bonding Jumper.

Substantiation:

Incorrect application of this section is quite common. The addition of this new term will make 250.30 a more user friendly section.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement in Proposal 5-78 (Log #1725).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: There is no need to create this term "separately derived system bonding jumper" or any derivation of it to "system bonding jumper" as taken by the panel action. This "system bonding jumper" is the same thing as the "main bonding jumper" by its very use in this application. Adding terminology like this only adds to the confusion and misunderstanding that the panel is trying to clear up. From the standpoint of the connection between the equipment grounding conductor(s), possibly the grounding electrode conductor and the system grounded conductor (neutral) there is no technical difference between a "service" or a "separately derived system". Both are sources of power for supplying the premises wiring system that happens to be served by that system. If there is such a critical difference then the panel should also change the name of the "grounding electrode conductor" which typically does serve a slightly different purpose in separately derived systems than it does for a service. To do that is not warranted just as calling this conductor anything other than a "main bonding jumper" is not technically warranted. In today's deregulated utility world the "service" is at best a moving target. Utilities are selling parts of their exiting systems to owners whereby the "service" instantly is transformed into a "separately derived system" and as far as this conductor is concerned nothing changed in terms of form, function, application, duty, withstand etc. Conversely there are owners, like several universities, that are now selling their primary distribution to the local utility thereby instantly making many "separately derived systems" into "services". Again, regarding the connection between the neutral and the equipment grounding system, there is no difference in form or function, so why the need for a different term? The correct action for the panel is to change the definition of "main bonding jumper" in article 100 to reflect the real world application of this connection. There is a proposal to do exactly this, which CMP 5 will have the opportunity to comment on. See also comments on proposals 5-74, 5-78, 5-83 and 5-103. The panel action should be to reject this proposal and state the term "main bonding jumper" is the correct terminology to use.

5-85 Log #3058 NEC-P05 **Final Action: Reject**
(250-30(A)(1))

Submitter: Truman C. Surbrook, Michigan State University

Recommendation:

Add a new paragraph at the end of the existing paragraph to read as follows:
Where the bonding jumper for the separately derived system is located at the first system disconnecting means or overcurrent device and there is no effective ground-fault path between the separately derived system enclosure and the point of attachment of the bonding jumper to the grounded conductor, a bonding jumper shall also be run to the separately derived system enclosure. The size of the bonding jumper shall not be smaller than from Table 250.66 based upon the largest ungrounded conductor of the separately derived system.

Substantiation:

The NEC is presently not clear on the issue of installing and sizing a bonding jumper between the first disconnecting means enclosure and the separately derived system enclosure when that connection is not a metallic path such as conductors run in metal raceway. The rule should be made clear that a bonding jumper needs to be run back to the separately derived system enclosure and the minimum size of that bonding jumper.

Panel Meeting Action: Reject

Panel Statement:

This proposed text was addressed and added to the code for the 2002 edition in 250.30(A)(5).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-86 Log #1548 NEC-P05 **Final Action: Reject**
(250-30(A)(1) Exception)

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise text as follows:
250.30 Grounding Separately Derived Alternating-Current Systems.
(A) Grounded Systems. A separately derived ac system that is grounded shall comply with 250.30(A)(1) through (6).
Exception: High-impedance grounded neutral system grounding connection requirements shall not be required to comply with 250.30(A)(1) and (2) and shall be made as specified in 250.36 and 250.186.
(1) Bonding Jumper. A bonding jumper in compliance with 250.28(A) through (D) that is sized for the derived phase conductors shall be used to connect the equipment grounding conductors of the separately derived system to the grounded conductor. Except as permitted by 250.24(A)(3), this connection shall be made at any point on the separately derived system from the source to the first system disconnecting means or overcurrent device, or it shall be made at the source of a separately derived system that has no disconnecting means or overcurrent devices. The point of connection shall be the same as the grounding electrode conductor as required in 250.30(A)(2).
Exception No. 1: A bonding jumper at both the source and the first disconnecting means shall be permitted where d~~oing so does not establish a~~there are no continuous metallic paths <u>that creates a</u> parallel path for the grounded circuit conductor. Where a grounded conductor is used in this manner, it shall not be smaller than the size specified for the bonding jumper but shall not be required to be larger than the ungrounded conductor(s). For the purposes of this exception, connection through the earth shall not be considered as providing a parallel path.

Substantiation:

This revision is needed for clarity in the section.

Panel Meeting Action: Reject

Panel Statement:

The proposed text does not add clarity.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-87 Log #2476 NEC-P05 **Final Action: Reject**
(250-30(A)(1) Exception No. 1)

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Delete the Exception and renumber Exception No. 2 as No. 1.

Substantiation:

A bonding jumper should only be installed at the point where the grounding electrode conductor is connected to the system. If a parallel path does not exist at the time of original installation, one will likely exist eventually.

Panel Meeting Action: Reject

Panel Statement:

The organization of this section specifies that the installer is to select the location for the main bonding jumper in 250.30(A)(1) at the source, at the first disconnect or a convenient location in-between, then to install the grounding electrode conductor to that same location, 250.30(A)(2). The submitter's substantiation has this sequence backwards. The exception is required for cases such as an outdoor transformer serving a building using non-metallic conduit and not containing an equipment grounding conductor as permitted in Article 225. This is also permitted in 250.32(B)(2). Section 250.30(A)(1) and 250.30(A)(2) already require the grounding electrode conductor to terminate at the same location as the main bonding jumper. In the case of the exception, the installer has an option of locations and either would be acceptable. It is not likely the above case would ever be modified such that a parallel path was created. Code can only account for conditions at the time of installation and cannot anticipate all future possible changes that might create violations.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-88 Log #1508 NEC-P05 **Final Action: Reject**
(250-30(A)(2))

Submitter: Dann Strube Lanesville, IN

Recommendation:

Add additional text as follows:
Where the transformer supplying the separately derived system is located outside the building, at least one additional grounding connection shall be made from the grounded conductor to a grounding electrode, either at the transformer or elsewhere outside the building.

Substantiation:

The proposed language is derived from Section 250-24(A)(2) for utility supplies services. That section mandates two connections for an outdoor transformer. However, Section 250.30 seems to prohibit two connections for a customer owned transformer. The two systems are the same except for ownership of the transformer.

A major purpose of the second electrode is to deal with lightning, etc. that may be introduced into the system between the transformer and the structure. A customer owned system should be provided with protection equal to that given to a utility owned system.

It is possible to play "word games" with Section 250.32 and Part II of Article 225 to allow the use of two electrodes. One should not need "word games" to make the code work safely. Transformer ownership should not change the requirements in any case.

Panel Meeting Action: Reject

Panel Statement:

By adding this provision the parallel path provisions in 250.30(A)(1), Exception 1 are violated. This is not a service where typically there is no equipment grounding conductor from the utility that is installed and the grounded conductor (neutral) is used as both the neutral return and the ground-fault return path. Section 250.32(B) would apply since the outdoor transformer (structure 1) is serving the building (structure 2) and these provisions would generally require an equipment grounding conductor as well as a grounding electrode at least to the enclosure of the transformer. Section 250.30(A)(1) is clear that the bonding of the derived system can be done at the transformer or at the building disconnect or at both (Exception 1) only where a parallel path is not created.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-89 Log #1545 NEC-P05 **Final Action: Reject**
(250-30(A)(2))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.30(A)(2) as follows:
250.30(A)(2)
(2) Grounding Electrode Conductor. The grounding electrode conductor for a separately derived system or common grounding electrode conductor for multiple separately derived systems shall be connected to the nearest of the grounding electrodes as specified in 250.30(A)(4). The grounding electrode conductor shall be installed in accordance with (a) or (b). Where taps are connected to a common grounding electrode conductor, the installation shall comply with 250.30(A)(3).

Substantiation:

The choice of using the common grounding electrode conductor tap concept is often made for us as a requirement of Section 250.30(A)(4). Section 250.30(A)(4) sets up an order of priority that must be followed and has the effect of restricting when the grounding electrode conductor tap concept provided in Section 250.30(A)(2)(b) and 250.30(A)(3) could be used. Adding the reference to 250.30(A)(4) in this location should assist the users of the code in determining when the common grounding electrode conductor tap method provided in Section 250.30(A)(2)(b) could be used.

Panel Meeting Action: Reject

Panel Statement:

This proposal is too restrictive and most of the requirements are already covered in 250.30(A)(4).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-90 Log #1549 NEC-P05 **Final Action: Reject**
(250-30(A)(2))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.30(A)(2) as follows:
250.30(A)(2)
(2) Grounding Electrode Conductor. The grounding electrode conductor for a separately derived system or common grounding electrode conductor for multiple separately derived systems shall be connected to the nearest of the grounding electrodes as specified in 250.30(A)(4). The grounding electrode conductor shall be installed in accordance with (a) or (b). Where taps are connected to a common grounding electrode conductor, the installation shall comply with 250.30(A)(3).

Substantiation:

The choice of using the common grounding electrode conductor tap concept is often made for us as a requirement of Section 250.30(A)(4). Section 250.30(A)(4) sets up an order of priority that must be followed and has the effect of restricting when the grounding electrode conductor tap concept provided in Section 250.30(A)(2)(b) and 250.30(A)(3) could be used. Adding the reference to 250.30(A)(4) in this location should assist the users of the code in determining when the common grounding electrode conductor tap method provided in Section 250.30(A)(2)(b) could be used.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 5-89 (Log #1545).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-91 Log #1547 NEC-P05 **Final Action: Reject**
(250-30(A)(2)(b))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.30(A)(2)(b) as follows:
250.30(A)(2)(b)
(b) Multiple Separately Derived Systems. Where more than one separately derived system is connected to a common grounding electrode conductor as provided in 250.30(A)(3), the common grounding electrode conductor shall be sized in accordance with 250.66, based on the total cm area of the ~~largest~~ derived phase conductors ~~from each~~ of all separately derived systems connected to the common grounding electrode conductor.

Substantiation:

The present wording is unclear as to sizing requirements for the common grounding electrode conductor when utilizing the grounding electrode conductor tap concept as provided in 250.30(A)(3). This should clarify that the size of the common grounding electrode conductor would be based on the total cm area of all of the derived systems added together.

Panel Meeting Action: Reject

Panel Statement:

The panel concludes that the common grounding electrode conductor should be the maximum size of Table 250.66 to allow for additional installations in the future.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

DOBROWSKY: The proposal should be accepted as submitted. The NEC should not contain requirements for possible future additional installations as covered by 90.1(B).

JOHNSTON: This proposal should be accepted in principle because the clarification in the requirement was already accepted in the reorganization of Section 250.30 as a result of the efforts of the task group. See Panel action on Proposal 5-78 and 5-79. The same concept proposed in proposal 5-91 is already included in the task group's work on Section 250.30, which was accepted in principle by CMP-05 at the panel ROP hearings in January 2003.

Comment on Affirmative:

RAPPAPORT: I disagree with the Panel Statement. The maximum size of #3/0 is not acceptable. The purpose of the grounding electrode conductor within a building when supplied from a service or other separately derived system is to stabilize the voltage and minimize transient overvoltages. The other purposes of a grounding electrode conductor such as to limit voltage due to lightning or contact with higher voltage systems do not exist in the above situation. Stabilizing the voltage can be adequately accomplished by sizing the grounding electrode conductor for the single largest separately derived system.

5-92 Log #2393 NEC-P05 **Final Action: Reject**
(250-30(A)(2)(b))

Submitter: Bob Fahey Evansville, WI

Recommendation:

Add new language at the end of this section for clarification of sizing the common grounding electrode conductor:
"The common grounding electrode conductor shall not be required to be larger than the values in Table 250.66

Substantiation:

The misconception of the the current code language with some people,is if you exceed the circular mill area given in Table 250.66 for the secondary phase conductors of the seperately derived systems, then you must use the .125 percent rule which applies to sizing the bonding jumper. I know the maximum size is the values given in 250.66, but I believe this would add clarity for the users of the NEC.

Panel Meeting Action: Reject

Panel Statement:

The present language is clear. There are presently no requirements that the common grounding electrode conductor has to exceed the sizes of Section 250.66.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-93 Log #3163 NEC-P05 **Final Action: Accept in Principle**
(250-30(A)(2)(b))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass Electrical Code Adv. Committee

Recommendation:

Revise to read as follows:
(b) Multiple Separately Derived Systems. Where more than one separately derived system is connected to a common grounding electrode conductor as provided in 250.30(A)(3), the common grounding electrode conductor shall not be smaller than 3/0 AWG copper or 250 kcmil aluminum.

Substantiation:

This amendment is an attempt to avoid likely widespread inconsistency in applying the new common grounding electrode rule for separately derived systems. The literal text of the NEC will call for a sizing calculation based on the largest phase conductor (the singular number) from each system. This is likely to end up as the worst case conductor from the systems involved. For example, if system #1 requires 8 AWG and system #2 requires a 3 AWG, then the common conductor would be 3 AWG. This makes sense if you assume that significant currents would be unlikely to flow over this conductor at any given time from multiple systems.

The 3/0 minimum is what was contained in the original IAEI proposal, and it makes sense because this is a conductor that will likely see other systems attached over time, and the 3/0 size is the worst possible case for grounding electrode conductors in general. The panel decided to reduce the size based on actual systems installed. However, several panel members have said that the intent was to sum the cross-sectional areas of the largest phase conductors of the various systems (this is the plural form although the NEC will be singular) and then derive the minimum size for a common grounding electrode conductor.

The substantiation for this approach relies on the questionable assertion that a short-time event will involve multiple systems to the point of overwhelming a conductor sized otherwise. However, it must be noted that although this approach will rapidly result in a 3/0 conductor, there is no technical substantiation that would limit it to this size. Indeed, if multiple systems are likely to cause this sort of cascade effect, then a 3/0 conductor would be woefully undersized in many common applications. This size will be widely understood and consistently applied.

Panel Meeting Action: Accept in Principle

Panel Statement:

The action for this proposal has been incorporated into the panel action on Proposal 5-78 (Log #1725). See panel action and statement on Proposal 5-78 (Log #1725).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

DOBROWSKY: The proposal should be accepted as submitted. The NEC should not contain requirements for possible future additional installations as covered by 90.1(B).

RAPPAPORT: See my Comment on Affirmative on Proposal 5-91.

Comment on Affirmative:

BOKSINER: While, in general, this is a good proposal, consideration should be given to allowing a reduction in the size of the common GEC in small structures, where it is unlikely that large separately derived systems (requiring the maximum size) would ever be installed.

5-94 Log #3215 NEC-P05 **Final Action: Reject**
(250-30(A)(3))

Submitter: William F. Laidler Hanover, MA

Recommendation:

Modify to read as follows:
Connections. All connections shall be made at an accessible location by means of ~~an irreversible compression~~ a connector listed for the purpose, or listed connections to copper busbars not less than 6 mm x 50 mm (1/4 in. x 2 in.), ~~or by the exothermic welding process.~~ The tap conductors shall be connected to the common grounding electrode conductor as specified in 250.30(A)(2)(b) in such a manner that the common grounding electrode conductor remains without a splice or joint.

Substantiation:

Currently, this section requires that the tap conductors attached to the common electrode conductor be made by means of irreversible compression connector listed for the purpose, by exothermic welding. I call your attention to section 250.64(D) Grounding Electrode Conductor Taps. This section allows the connection of taps to a grounding electrode conductor without specific reference to these two more exotic methods. If the Common Grounding Electrode Conductor is in fact a single conductor cable why would a split bolt connector be an issue in 250.30(A)(3) and not in 250.64(D)?

Panel Meeting Action: Reject

Panel Statement:

Exothermic welding and irreversible connectors are acceptable means of connections.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

DOBROWSKY: The proposal should be accepted. Having a requirement for listed connections should be sufficient as covered by 250.8. The panel statement does not address the submitter's intent. Presently, irreversible connections are required for separately derived systems but not for services. Equipment that is listed and evaluated according to the product standard for grounding and bonding equipment should be acceptable for use without further restrictions.

5-95 Log #1550 NEC-P05 **Final Action: Reject**
(250-30(A)(3)(b))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.30(A)(3)(b) as follows:
250.30(A)(3)(b)
(b) Connections. All connections shall be made at an accessible location by an irreversible compression connector listed for the purpose, or other listed pressure connectors, ~~listed connections to copper busbars not less than 6 mm x50 mm (1/4 in. x 2 in.)~~, or by the exothermic welding process. The tap conductors shall be connected to the common grounding electrode conductor as specified in 250.30(A)(2)(b) in such a manner that the common grounding electrode conductor remains without a splice or joint.

Substantiation:

This change will provide consistency between the grounding electrode conductor tap concept permitted in Section 250.64(D) and 250.30(A)(2)(b). The methods of connecting the grounding electrode conductor taps to the common grounding electrode conductor for separately derived systems permitted in the 2002 NEC Section 250.30(A)(3)(b) are currently more restrictive than that allowed for services in 250.64(D). this change should provide uniformity and consistency between the two sections and electrically accomplish the same end result.

Panel Meeting Action: Reject

Panel Statement:

The substantiation does not support the deletion of the use of a bus bar.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-96 Log #559 NEC-P05 **Final Action: Reject**
(250-30(A)(3)(d))

Submitter: J. Kevin Vogel, Crescent Electrical Supply

Recommendation:

Revise text to read as follows:
(d) Bonding. Where exposed structural steel that is interconnected to form the building frame or interior metal piping exists in the area served by the separately derived system, ~~it~~ they shall be bonded to the grounding electrode conductor in accordance with 250.104.

Substantiation:

Editorial correction.

Panel Meeting Action: Reject

Panel Statement:

Exposed structural steel is the subject and is singular. The proposed change in language is not grammatically correct.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-97 Log #1551 NEC-P05 **Final Action: Accept in Principle**
(250-30(A)(4))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise text as follows:
(4) Grounding Electrode. The grounding electrode shall be as near as practicable to and preferably in the same area as the grounding electrode conductor connection to the system. The grounding electrode shall be the nearest one of the following:
(1) An effectively grounded structural metal member of the structure
(2) An effectively grounded metal water pipe within 1.5 m (5 ft) from the point of entrance into the building
Exception: In industrial and commercial buildings where conditions of maintenance and supervision ensure that only qualified persons service the installation and the entire length of the interior metal water pipe that is being used for the grounding electrode is exposed, the connection shall be permitted at any point on the water pipe system.
(3) Any other electrode(s) as specified by 250.52 where the electrodes specified by 250.30(A)(4)(1) or (A)(4)(2) are not available.

Substantiation:

The revision is for clarification. As presently written, the language in 250.30(A)(4)(3) could be literally taken to require all other electrodes specified in 250.52 must be used.

Panel Meeting Action: Accept in Principle

The action for this proposal has been incorporated into the panel action of Proposal 5-78 (Log #1725).

Panel Statement:

See panel action and statement on Proposal 5-78 (Log #1725).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-98 Log #2477 NEC-P05 **Final Action: Reject**
(250-30(A)(4))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
(4) Grounding Electrode. The grounding electrode shall be as near as practicable to and preferably in the same area as the grounding electrode conductor connection to the system. The grounding electrode shall be the nearest one of the following:
(1) An effectively grounded structural metal member of the structure
(2) The portion of an ~~An~~ effectively grounded metal water pipe that is within 1.5 m (5 ft) from the point of entrance into the building

Substantiation:

This proposal is to help clarify that the water pipe connection is measured to any portion that is within the first 5 ft into the building. The other subdivisions and exceptions are not deleted or modified by this proposal.

Panel Meeting Action: Reject

Panel Statement:

The revised text does not add clarity to the section.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-99 Log #2716 NEC-P05 **Final Action: Reject**
(250-30(A)(4) Exception No. 2 (New))

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Renumber existing Exception as Exception No. 1 and add new Exception No. 2 as follows:
"Exception No. 2: Where a transformer is used as a separately derived system and where the transformer primary feeder circuit originates in the same building or structure, a grounding electrode shall not be required."

Substantiation:

There is no electrical or safety related reason to require a grounding electrode for a transformer used as a separately derived system when the primary power source for the transformer is located in the same building or structure. The requirements of 250.4(A)(1) are met without the use of a grounding electrode at the secondary side of the transformer. Lighting is not a problem within the building or structure. The only possible contact with a higher voltage system is a fault on the primary feeder and this fault will be cleared by the primary feeder equipment grounding conductor. The bonding required by 250.30(A)(1) will stabilize the voltage to earth under normal operating conditions. The same bonding in combination with the primary feeder equipment grounding conductor will limit the effect of line surges. The addition of a direct connection from the secondary side of a separately derived system to a grounding electrode provides no additional protection over that which is already provided by the primary feeder equipment grounding conductor.

Panel Meeting Action: Reject

Panel Statement:

The present requirements for separately derived systems to be grounded to a reference earth by a dedicated grounding electrode conductor apply to all systems without regard of installation inside or outside the building or structure served. The primary reason is to establish an earth ground reference and stabilize the system voltage around this reference. The equipment grounding conductor from the source to the separately derived system does not meet the requirements for size, not having a choke effect when installed in metal raceways, multiple terminations, etc. The equipment grounding conductor's primary purpose is to provide a low impedance path for fault current in the event of a ground-fault on the system up to and including the primary of the transformer, not to act as the low impedance earth reference conductor.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: The purpose of the grounding electrode conductor in the proposed Exception is to stabilize voltage. See my Comment on Affirmative on Proposal 5-91. An equipment grounding conductor, run with the feeder to the separately derived system and sized for the separately derived system, should be adequate.

5-100 Log #359 NEC-P05 **Final Action: Accept in Principle**
(250-30(A)(4)(1))

Submitter: Roy D. Broderson, Washington State Labor and Industries

Recommendation:

Revise as follows:
250.30(A)(4)(1) An effectively grounded structural steel member of the structure <u>in accordance with 250.52(A)(2).</u>

Substantiation:

Some installers and inspectors allow building steel, where bonded per 250.104(C) at the building service, to be considered effectively grounded when selecting the nearest grounding electrode for a separately derived system per 250.30(A)(4)(1). This does not meet the definition of "grounded, effectively" in article 100 and the bonding jumper at the service may not always be sized as large as the grounding electrode conductor required for the new separately derived system per 250.30(A)(2)(a).

Panel Meeting Action: Accept in Principle

The action for this proposal has been incorporated into the panel action of Proposal 5-78 (Log #1725).

Panel Statement:

See panel action and statement on Proposal 5-78 (Log #1725).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-101 Log #358 NEC-P05 **Final Action: Accept in Principle**
(250-30(A)(4)(2))

Submitter: Roy D. Broderson, Washington State Labor and Industries

Recommendation:

Revise as follows:
250.30(A)(4)(2) An effectively grounded metal water pipe within 1.5 m (5 ft) from the point of entrance into the building in accordance with 250.52(A)(1).

Substantiation:

Some installers and inspectors allow interior water piping, where bonded per 250.104(A)(1) at the service, to be considered effectively grounded when selecting the nearest grounding electrode for a separately derived system even though there is not 10 feet of metal underground water pipe in direct contact with the earth. This may not meet the definition of "grounded effectively" in Article 100 and the bonding jumper at the service may not always be sized as large as the grounding electrode conductor required for the new separately derived system per 250.30(A)(2)(a).

Panel Meeting Action: Accept in Principle

The action for this proposal has been incorporated into the panel action of Proposal 5-78 (Log #1725).

Panel Statement:

See panel action and statement on Proposal 5-78 (Log #1725).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-102 Log #1552 NEC-P05 **Final Action: Accept in Principle**
(250-30(A)(5))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.30(A)(5) as follows:
(5) Equipment Bonding Jumper Size. Where a bonding jumper is run with the derived phase conductors from the source of a separately derived system to the first disconnecting means, it shall be sized in accordance with ~~250.28(A) through (D),~~ 250.102(C), based on the size of the derived phase conductors.

Substantiation:

Section 250.30(A)(5) refers to 250.28(A) through (D) for sizing requirements for equipment bonding jumpers installed with secondary conductors of derived systems from the source enclosure to the first disconnecting means enclosure. These sizing requirements in 250.28 do not currently address installations where the secondary of the separately derived system is installed as parallel conductors in separate raceways. The revision would require the bonding jumper to be sized based on the total cm area of the parallel conductors where installed in a single raceway or enclosure, but also permit the size of the equipment bonding jumper to be based on the derived phase conductors installed in each individual raceway as permitted for services in 250.102(C). This should add consistency to between the two sections and clarify the intent.

Panel Meeting Action: Accept in Principle

The action for this proposal has been incorporated into the panel action of Proposal 5-78 (Log #1725).

Panel Statement:

See panel action and statement on Proposal 5-78 (Log #1725).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-103 Log #1553 NEC-P05 **Final Action: Accept in Part**
(250-30(A)(6))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise 250.30(A)(6) as follows:
Grounded Conductor. Where a grounded conductor is installed and the system main bonding jumper is not located at the source of the separately derived system, the following shall apply:
(a) Routing and Sizing. This conductor shall be routed with the derived phase conductors and shall not be smaller than the required grounding electrode conductor specified in Table 250.66, but shall not be required to be larger than the largest ungrounded derived phase conductor. In addition, for phase conductors larger than 1100 kcmil copper or 1750 kcmil aluminum, the grounded conductor shall not be smaller than 12 1/2 percent of the area of the largest derived phase conductor. The grounded conductor of a 3-phase, 3-wire delta system shall have an ampacity not less than the ungrounded conductors.
(b) Parallel Conductors. Where the derived phase conductors are installed in parallel, the size of the grounded conductor shall be based on the total circular mil area of the parallel conductors as indicated in this section. Where installed in two or more raceways, the size of the grounded conductor in each raceway shall be based on the size of the ungrounded conductors in the raceway but not smaller than 1/0 AWG.
FPN: See 310.4 for grounded conductors connected in parallel.
(c) High Impedance. The grounded conductor on a high-impedance grounded neutral system shall be grounded in accordance with 250.36.

Substantiation:

This proposal is a companion proposal that works together with the revised definition of "Bonding Jumper, Main" in Article 100 if accepted. The revision is needed to be consistent with the revisions definition of "Bonding Jumper, Main".

Panel Meeting Action: Accept in Part

The panel accepts the insertion of the word "system" and reject the term "main." The action for this proposal has been incorporated into the panel action of Proposal 5-78 (Log #1725).

Panel Statement:

Using the word "main" does not apply in this case. See panel action and statement on Proposal 5-78 (Log #1725).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: The panel action should be accept in part but delete the term "system" and leave the term "main". There is no need to create this term "system bonding jumper" which is the same thing as the "main bonding jumper" by its very use in this application. Adding terminology like this only adds to the confusion and misunderstanding that the panel is trying to clear up. From the standpoint of the connection between the equipment grounding conductor(s), possibly the grounding electrode conductor and the system grounded conductor (neutral) there is no technical difference between a "service" or a "separately derived system". Both are sources of power for supplying the premises wiring system that happens to be served by that system. If there is such a critical difference then the panel should also change the name of the "grounding electrode conductor" which typically does serve a slightly different purpose in separately derived systems than it does for a service. To do that is not warranted just as calling this conductor anything other than a "main bonding jumper" is not technically warranted. In today's deregulated utility world the "service" is at best a moving target. Utilities are selling parts of their exiting systems to owners whereby the "service" instantly is transformed into a "separately derived system" and as far as this conductor is concerned nothing changed in terms of form, function, application, duty, withstand etc. Conversely there are owners, like several universities, that are now selling their primary distribution to the local utility thereby instantly making many "separately derived systems" into "services". Again, regarding the connection between the neutral and the equipment grounding system, there is no difference in form or function, so why the need for a different term? The correct action for the panel is to change the definition of "main bonding jumper" in article 100 to reflect the real world application of this connection. There is a proposal to do exactly this, which CMP 5 will have the opportunity to comment on. See also comments on proposals 5-74, 5-78, 5-80 and 5-83.

5-104 Log #3366 NEC-P05 **Final Action: Reject**
(250-30(A)(7) (New))

Submitter: Donald W. Zipse, Zipse Electrical Engineering, Inc.

Recommendation:

Add new text as follows:
250.30(A)(7) Multigrounded Neutral Conductor.
The multigrounded neutral conductor shall combine two functions into one conductor. The function of the neutral conductor and the equipment-grounding conductor shall be combined into one conductor to be called the multigrounded neutral conductor.
The multigrounded neutral conductor shall be colored white with a green strip spiraled around the conductor.

Substantiation:

The electrical laws and the physics associated with electricity apply equally to high voltage as well as to low voltage. There is no difference in applying the laws to low voltage or to high voltage.
Therefore, since Panel 5 adopted 250.184 during the 2002 code cycle for high voltage the same applications must be acceptable for low voltage.
Only two wires will be necessary for wiring receptacles from now on based on Panel 5's adoption of 250.184 thus saving over one-third the installation costs when the neutral (white) conductor and the equipment-grounding conductor (green) are combined into one conductor white with green spiral marking.
It will be necessary to have a conductor marked for multigrounded neutral applications when costs savings are to be applied to the installation of receptacles.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 5-34 (Log #3374).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-105 Log #712 NEC-P05 **Final Action: Reject**
(250-30(B))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise:
(B) Ungrounded Systems. The exposed noncurrent-carrying metal parts of enclosures, raceways, cables, and equipment of an ungrounded separately derived system supplied from a stand-alone power source (such as an engine-generator set) shall be grounded as specified in (1) and (2). Add to (1): or overcurrent device, or it shall be made at the source of a separately derived system that has no disconnecting means or overcurrent devices.

Substantiation:

A separate grounding electrode and grounding electrode conductor is not warranted for an ungrounded separately derived system such as service-supplied transformer secondary where all equipment grounding is already covered by other Code rules and the grounding electrode may be the service electrode, or if separate is required to be bonded to it. A specific grounding electrode and grounding electrode conductor is not required for ungrounded direct-current separately derived systems unless they are supplied from a stand-alone source (250.169). The point of connection of the GEC should correlate with 250.169 for similar grounding. (Style Manual 3.3.5)

Panel Meeting Action: Reject

Panel Statement:

The grounding electrode for ungrounded separately derived systems is required just as it is required for ungrounded services in 250.24(D) and also to meet the performance requirements of 250.4(B)(1).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-106 Log #610 NEC-P05 **Final Action: Reject**
(250-31 (New))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Add 250.31 to read as follows:
Other then Separately Derived Systems. A premises wiring system as covered in 250.20(A) and (B) whose power is derived from a generator(s), transformer(s), or converter windings, and that has a direct electrical connection to supply conductors originating in another similar system shall be grounded in accordance with 250.30(A) and with the following additional requirements: 1. Grounding and bonding connections shall be made to the grounded conductor derived from the higher kVA rated source. 2. The size of the grounding electrode conductor and the bonding jumper shall be based on the derived phase conductors of the higher kVA rated source.

Substantiation:

Where a transformer secondary and alternative source generator output conductors are solidly interconnected and intended to be a grounded neutral or phase conductor, and the two systems are installed at the same time, neither meets the definition of a separately derived system. System grounding is generally required by 250.20, however since neither source is technically a separately derived system, specific requirements are lacking. For example, since the kVA ratings of a normal service-supplied transformer and an interconnected alternative engine-generator used for backup or peak power loads may be different, with different sizes of derived system conductors, there are no rules specified as to which system shall be used to establish grounding and bonding requirements. Where a separately derived system such as a transformer secondary is neutral or phase grounded, and at a later date an engine-generator with a higher kVA rating is added, with a solidly interconnected neutral or phase conductor, the bonding/grounding conductor size for the transformer may not suffice for the generator.

Panel Meeting Action: Reject

Panel Statement:

The code adaquately addresses these installations. There is no technical substantiation presented that problems exist in the thousands of installations that have been correctly designed, installed and operated.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-107 Log #831 NEC-P05 **Final Action: Accept in Principle in Part**
(250-32)

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise:

~~Two~~ One or More Buildings or Structures Supplied from a ~~Common~~ Remote Service or Separately Derived System.

(A) Grounding Electrode. Where~~ two or more buildings or structures are supplied from a common ac service by~~ a feeder(s) or branch circuit(s) is supplied from a remote ac service(s) or a remote stand-alone separately derived ac system(s) the grounding electrode(s) ~~required~~ specified in Part III of this article, at each building or structure served shall be connected in the manner specified in 250.32(B) or (C). Where there are no existing grounding electrodes ~~the~~ a grounding electrode system in compliance with ~~required in~~ Part III of this article shall be installed.

Exception: A grounding electrode at the separate building or structure served shall not be required where only one branch circuit supplies the building or structure and the branch circuit includes an equipment grounding conductor for grounding the conductive noncurrent-carrying parts of ~~all~~ equipment.

(B)~~ Grounded Ssystems~~. Grounding and Bonding Connections. ~~For a grounded system at~~ At the separate building or structure served the connection to the grounding electrode and ~~or~~ bonding or equipment, structures, or frames ~~required~~ to be grounded or bonded shall comply with either 250.32(B)(1) or (2).

(1) Equipment Grounding Conductor. An equipment grounding conductor as described in 250.118 shall be run with the supply conductors and connected to the building or structure disconnecting means and to the grounding electrode(s). The equipment grounding conductor shall be used for grounding and ~~or~~ bonding of metal piping equipment, structures, or frames ~~required~~ to be grounded or bonded. Wire-type ~~The~~ equipment grounding conductors shall be sized in accordance with 250.122. Any installed grounded conductor shall not be connected to the equipment grounding conductor or to the grounding electrode(s) at the building or structure served.

(2) Grounded Conductor. An equipment grounding conductor shall not be required to be run with the supply conductors to the building or structure where, ~~(2)~~ (1) there are no other continuous metallic paths, including equipment grounding conductors and grounded conductors of other circuits, bonded to the grounded systems in both buildings or structures involved; and ~~(3)~~ (2) ground-fault protection ~~of equipment~~ has not been installed on the ~~common ac service~~ supply side of the building or structure disconnecting means, and (3) The grounded circuit conductor shall be connected to the building or structure disconnecting means and to the grounding electrodes, and shall be used for grounding ~~or~~ and bonding of metal piping, equipment, structures, or frames ~~required~~ to be grounded or bonded. The size of the grounded conductor shall not be smaller than the larger of :

(1) That required by 220.22

(2) That required by 250.122

~~(C) Ungrounded Systems. The grounding electrodes shall be connected to the building or structure disconnecting means.~~

Substantiation:

Present wording does not apply to a separate building supplied by a service in another building that does not supply circuits in the building in which the service is located. For example, a building with a single-phase and a 3-phase service where the single-phase service supplies only a second building and, therefore, is not "common" to both. It also does not cover circuits supplied by a stand-alone separately derived system such as a diesel generator set or photovoltaic system since these are not services. If an outdoor service pedestal or substation supplies only one building, this section may be deemed as not applicable unless the pedestal and substation are considered as structures and have equipment supplied by a branch circuit or feeder.

In (A), grounding electrodes are indicated as being "required" by Part III which relates to specifications and installation; the only requirement to install an electrode is the last sentence of 250.50.

The exception in (A) suggests the EGC is for grounding all equipment, which may be deemed to include double-insultated equipment or equipment with no exposed conductive parts.

The provisions of (B) and (B)(1) should not be limited to grounded systems but should include ungrounded systems, whereby (C) which does not contain the specifics of (B)(1), may be deleted.

Provisions in (B) should apply whether grounding or bonding is required, or by choice.

The present (B)(2)(1) indicates a condition but not literally a permission or requirement to omit the equipment grounding conductor of (B)(1), and doesn't modify other sections which require an EGC to be run with the circuit conductors.

The requirement in (B)(2) is modified to clearly indicate to Code users that equipment grounding conductors and re-grounded conductors (neutrals) of other circuits or systems may constitute a continuous metallic path between the grounding systems in both buildings. In many cases, this requirement may limit the supply to one circuit (total), which may not have been the intended result, since it complicates other sections of the Code, such as 225.30(A).

Panel Meeting Action: Accept in Principle in Part

Changes to 250.32(B) and (C) are not accepted. Changes to 250.32(A) are accepted in principle. The action for this proposal has been incorporated into the panel action of Proposal 5-109 (Log #1560).

Panel Statement:

The proposal to change the concept of "supplied from a common service" is a revision that is needed to clarify that not all separate buildings or structures on the premises are supplied from a common service. The changes proposed to 250.32(B)(1) and (2) do not add clarity to the section. There is no substantiation provided that supports deleting 250.32(C) for ungrounded systems as proposed. The grounding electrode connection to the metal enclosures at the separate building or structure is required for safety and must meet the performance provisions of 250.4(B). See the panel action and statement on Proposal 5-109 (Log #1560).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-108 Log #1556 NEC-P05 **Final Action: Accept in Principle**
(250-32)

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise the title and Section 250.32 as follows:

250.32 Two or More Buildings or Structures Supplied by a Feeder(s) or Branch Circuit(s) from a Common Service.

(A) Grounding Electrode. Where two or more buildings or structures are supplied ~~from a common ac service~~ by a feeder(s) or branch circuit(s), the grounding electrode(s) required in Part III of this article at each building or structure shall be connected in the manner specified in 250.32(B) or (C). Where there are no existing grounding electrodes, the grounding electrode(s) required in Part III of this article shall be installed.

Substantiation:

The revision would expand the requirements of this section to installations beyond those limited to feeders and branch circuits that might not originate from a "common service". A feeder(s) supplying separate buildings or other structures can be supplied from separate services or other sources. The revision provides more inclusive coverage to address feeders that may be derived from different services or from other separately derived systems. The clarification would work more consistently with the provisions in Part II of Article 225.

Panel Meeting Action: Accept in Principle

Panel Statement:

The action for this proposal has been incorporated into the panel action of Proposal 5-109 (Log #1560). The panel concludes that the revised text meets the intent of the submitter. See panel action and statement on Proposal 5-109 (Log #1560).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-109 Log #1560 NEC-P05 **Final Action: Accept in Principle**
(250-32)

TCC Action:

See the Technical Correlating Committee note on Proposal 5-1.

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise the title and Section 250.32 as follows:

250.32 Two or More Buildings or Structures Supplied by a Feeder(s) or Branch Circuit(s) ~~from a Common Service.~~

(A) Grounding Electrode. Where two or more buildings or structures are supplied ~~from a common ac service~~ by a feeder(s) or branch circuit(s), the grounding electrode(s) required in Part III of this article at each building or structure shall be connected in the manner specified in 250.32(B) or (C). Where there are no existing grounding electrodes, the grounding electrode(s) required in Part III of this article shall be installed.

Substantiation:

The revision would expand the requirements of this section to installations beyond those limited to feeders and branch circuits that might not originate from a "common service". A feeder(s) supplying separate buildings or other structures can be supplied from separate services or other sources. The revision provides more inclusive coverage to address feeders that may be derived from different services or from other separately derived systems. The clarification would work more consistently with the provisions in Part II of Article 225.

Panel Meeting Action: Accept in Principle

Revise 250.32 title and 250.32(A) to read as follows:

250.32 Buildings or Structures Supplied by Feeder(s) or Branch Circuit(s).

(A) Grounding Electrode. Building(s) or structure(s) supplied by feeder(s) or branch circuit(s) shall have a grounding electrode or grounding electrode system installed in accordance with 250.50. The grounding electrode conductor(s) shall be connected in accordance with 250.32(B) or (C). Where there is no existing grounding electrode, the grounding electrode(s) required in 250.50 shall be installed.

Exception: A grounding electrode shall not be required where only a single branch circuit supplies the building or structure and the branch circuit includes an equipment bonding conductor for grounding the conductive non-current-carrying parts of equipment. For the purpose of this section, a multiwire branch circuit shall be considered as a single branch circuit.

Panel Statement:

This action meets the intent of the submitter. In addition to this proposal, the changes from Proposals 5-1 (Log #2453e), 5-107 (Log #831), 5-108 (Log #1556), and 5-110 (Log #1554) have been incorporated into this panel action.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-110 Log #1554 NEC-P05 (250-32(A)) **Final Action: Accept in Principle**

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.32(A) as follows:

250.32 Two or More Buildings or Structures Supplied from a Common Service.

(A) Grounding Electrode. Where two or more buildings or structures are supplied from a common ac service by a feeder(s) or branch circuit(s), the grounding electrode(s) required in Part III of this article at each building or structure shall be connected in the manner specified in 250.32(B) or (C). Where there are no existing grounding electrodes, the grounding electrode(s) required in Part III of this article shall be installed.

~~Exception:~~ A grounding electrode(s) at separate buildings or structures shall not be required where only ~~one branch~~ a single circuit supplies the building or structure and the branch circuit includes an equipment grounding conductor for grounding the conductive non–current-carrying parts of all equipment. For the purpose of this section, a multiwire branch circuit shall be considered a single circuit.

Substantiation:

This revision provides clarity and also consistency with language that already exists in Section 225.30 (More than One Building or Other Structure). There has been some confusion in the field as to the wording in the present exception as to whether a multiwire branch circuit would be acceptable as well as a single line-to-line or line-to-neutral circuit to meet the intent of the section.

Panel Meeting Action: Accept in Principle

Panel Statement:

The action for this proposal has been incorporated into the panel action of Proposal 5-109 (Log #1560). See panel action and statement on Proposal 5-109 (Log #1560).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-111 Log #2478 NEC-P05 **Final Action: Accept in Principle**
(250-34)

TCC Action:

See the Technical Correlating Committee note on Proposal 5-1.

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:

(A) Portable Generators. The frame of a portable generator shall not be required to be grounded ~~and shall be permitted to serve as the grounding electrode~~ for a system supplied by the generator under the following conditions:

(1) The generator supplies only equipment mounted on the generator, cord-and-plug-connected equipment through receptacles mounted on the generator, or both, and

(2) The non-current-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame.

(B) Vehicle-Mounted Generators. The frame of a vehicle shall not be required to be grounded ~~be permitted to serve as the grounding electrode~~ for a system supplied by a generator located on the vehicle under the following conditions:

(1) The frame of the generator is bonded to the vehicle frame, and

(2) The generator supplies only equipment located on the vehicle or cord-and-plug-connected equipment through receptacles mounted on the vehicle, or both equipment located on the vehicle, and cord-and-plug-connected equipment through receptacles mounted on the vehicle or on the generator, and

(3) The non-current-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame, and

~~(4) The system complies with all other provisions of this article:~~

Substantiation:

The use of the term electrode is incorrect because there is no connection to the earth. The requirement is to simply provide a path for fault current.

Subdivision (4) is deleted because it does not add value. The other provisions of this article are already enforceable.

Panel Meeting Action: Accept in Principle

Revise 250.34 (A) and (B) as follows:

(A) Portable Generators. The frame of a portable generator shall not be required to be ~~grounded~~ connected to a grounding electrode as defined in 250.52 ~~and shall be permitted to serve as the grounding electrode~~ for a system supplied by the generator under the following conditions:

(1) The generator supplies only equipment mounted on the generator, cord-and-plug-connected equipment through receptacles mounted on the generator, or both, and

(2) The non-current-carrying metal parts of equipment and the receptacle terminal(s) for the connection to the equipment bonding ~~grounding~~ conductor ~~terminals of the receptacles~~ are bonded to the generator frame.

(B) Vehicle-Mounted Generators. The frame of a vehicle shall not be required to be ~~grounded~~ connected to a grounding electrode as defined in 250.52 ~~be permitted to serve as the grounding electrode~~ for a system supplied by a generator located on the vehicle under the following conditions:

(1) The frame of the generator is bonded to the vehicle frame, and

(2) The generator supplies only equipment located on the vehicle or cord-and-plug-connected equipment through receptacles mounted on the vehicle, or both equipment located on the vehicle, and cord-and-plug-connected equipment through receptacles mounted on the vehicle or on the generator, and

(3) The non-current-carrying metal parts of equipment and the receptacle terminal(s) for the connection to the equipment bonding ~~grounding~~ conductor ~~terminals of the receptacles~~ are bonded to the generator frame., ~~, and~~

~~(4) The system complies with all other provisions of this article:~~

Panel Statement:

The revised text provides clarification for not connecting generator frames to grounding electrodes as defined in 250.52.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: My vote would be affirmative except that the term "equipment bonding conductor" is not acceptable. See my Explanation of Negative on Proposal 5-1.

5-112 Log #2651 NEC-P05 **Final Action: Reject**
(250-34)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Create a new opening paragraph for 250.34 as follows:
250.34 Portable and Vehicle-Mounted Generators. A separately derived system produced by a portable or vehicle-mounted generator that supplies a premises wiring system shall comply with 250.30. Other portable or vehicle-mounted generators shall comply with (A) through (C).

Substantiation:

This proposed language seems necessary to clarify that where connected to a premises wiring system and a component of a separately derived system, the frame of a portable or vehicle-mounted generator is required to be connected to one or more grounding electrodes at the generator. As presently worded, (A) and (B) indicated that the frame of the generator is not required to be grounded and conflicts with the requirements for separately derived systems in 250.30.

Panel Meeting Action: Reject

Panel Statement:

Accepting this proposal would cause confusion with the definition of premises wiring.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-113 Log #2964 NEC-P05 **Final Action: Reject**
(250-34(A), (B), (C))

Submitter: David Soffrin, American Petroleum Institute

Recommendation:

Replace the present wording of these sections with:
250.34 Portable and Vehicle-Mounted Generators.
(A) Grounding of Generator Frames. The frames of portable or vehicle-mounted generators shall be grounded.
~~(A) Portable Generator. The frame of a portable generator shall not be required to be grounded and shall be permitted to serve as the grounding electrode for a system supplied by the generator under the following conditions:~~
~~(1) The generator supplies only equipment mounted on the generator, cord-and-plug-connected equipment through receptacles mounted on the generator, or both, and~~
~~(2) The noncurrent-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame.~~
~~(B) Vehicle Mounted Generators. The frame of a vehicle shall be permitted to serve as the grounding electrode for a system supplied by a generator located on the vehicle under the following conditions:~~
~~(1) The frame of the generator is bonded to the vehicle frame, and~~
~~(2) The generator supplies only equipment located on the vehicle or cord-and-plug-connected equipment through receptacles mounted on the vehicle, or both equipment located on the vehicle and cord-and-plug-connected equipment through receptacles mounted on the vehicle or on the generator, and~~
~~(3) the noncurrent-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame, and~~
~~(4) The systems complies with all other provisions of this article.~~
~~(C~~B) Grounded Conductor Bonding. A system conductor that is required to be grounded by 250.26 shall be bonded to the generator frame where the generator is a component of a separately derived system.
FPN: For grounding portable generators supplying fixed wiring systems, see 250.20(D), 250.36 High-Impedance Grounded Neutral Systems.

Substantiation:

Grounding portable or vehicle-mounted generators according to the present wording can result in a shock hazard. For example, the neutrals on most 240/120 volt, single-phase, portable generators are bonded directly to the metal frame of the generator. An incident could occur with cord-and-plug connected equipment connected to the generator output. The "hot" conductor could become connected or faulted to "plant" ground (either through cord abuse, or a tool dropped in water). The output circuit breaker of the generator would not trip and provide no ground-fault protection, since no current would flow. During this situation, the entire frame of the generator would be raised to a potential of 120 volts with respect to ground (since the frame is not required to be grounded). This would represent a shock hazard to a person who came along and touched anything bonded to the generator's frame (since the person would create a path through the body between the frame to ground). Only if a GFCI were applied to the generator's receptacle (as required in 210.8) would any personnel protection be provided, but the person would still be shocked. GFCI protection is not required if the generator receptacle is other than 125 volt, single-phase, 15-, 20- and 30- ampere (see 527.6(B)) - the "assured equipment grounding conductor program" is an option but this would not provide protection from the shock hazard described above. For example, this would be the case for a 480 volt, three-phase portable or vehicle-mounted generator.
This situation could be eliminated by always assuring that the frame of a portable generator is required to be grounded (usually to nearby structural steel or a local ground grid).
Sections 250.34(A) (Portable generators and 250.34(B) (vehicle mounted generators) should both be replaced by the proposed wording under Section 250.34(A). Section 250.34(C) wording remains unchanged with only the subsection number changed to 250.34(B).

Panel Meeting Action: Reject

Panel Statement:

In many cases, grounding the portable generator may not be enforceable. Grounding the generator would not eliminate all of the hazards cited in the substantiation. In actuality it may increase the hazard and extend the area in which personnel are at risk. Portable generators are used in many different locations and to modify the present requirements may lead to hazardous conditions.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-114 Log #615 NEC-P05 **Final Action: Reject**
(250-34(A) and (c))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text to read as follows:

(A) Portable Generators. The frame of a portable generator shall not be required to be grounded and shall be permitted to serve as the grounding electrode for a system supplied by the generator under the following conditions: 1. No change. 2. No change. 3. The system complies with all other applicable provisions of this article.

(C) Grounded Conductor Bonding. A system conductor that is required to be grounded by 250.26 or 250.162, or grounded by choice, shall be bonded to the generator frame where the generator is a component of a separately derived system. Bonding shall be in accordance with 250.30(A)(1) or 250.168, as applicable.

FPN: For grounding of portable or vehicle mounted generators supplying field wiring systems, see 250.20(D) and Part VIII of this article.

Substantiation:

Portable generators should not be exempt from grounding but only permitted to serve as the grounding electrode. Present wording does not require any grounding. Subsections (A) and (B) do not differentiate between ac and dc generators, however (C) and the FPN are limited to ac systems. Conductors and systems may also be required to be grounded by 250.162. This proposal incorporates dc systems and references specifics for bonding. Since 250.20(D) applies to vehicle mounted ac generators, the FPN should reference dc vehicle mounted generators also.

Panel Meeting Action: Reject

Panel Statement:

The proposal was not submitted in accordance with paragraph 4-3.3 in the regulations governing committee projects. There was no technical substantiation provided for several text changes of added words without an underline or deleted word that do not have a strikeout or were in fact deleted from the text. The proposed changes do not add clarity. DC systems are covered in Part VIII.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-115 Log #1559 NEC-P05 **Final Action: Reject**
(250-50)

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.50 as follows:
Remove the wording containing the term "If available" and revise the first sentence.
250.50 Grounding Electrode System.
~~If available on~~ The grounding electrode or grounding electrode system for the premises at each building or structure served, shall be any electrode or combination of all such existing electrodes ~~each item~~ specified in 250.52(A)(1) through (A)(6). The electrode(s) shall be bonded together to form the grounding electrode system. Where none of these grounding electrodes specified by this section exist ~~are available~~, one or more of the electrodes specified in 250.52(A)(4) through (A)(7) shall be installed and used.

Substantiation:

This revision will remove the word "available" from a mandatory requirement. The section as previously worded left a lot of questions as to what the requirement of the section really is providing. If electrodes are present and inherent to building construction, it should be clear that all such electrodes should make up the grounding electrode system. It is also a style manual recommendation to avoid the word "available" in mandatory Code rules. The revision should help clarify what is intended relative to the grounding electrode system for buildings or structures.

Panel Meeting Action: Reject

Panel Statement:

This change will require the use of all the existing electrodes whether they are available or not. This requirement is not feasible for existing installations where all the electrodes are not available.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 13 Negative: 3

Explanation of Negative:

BRETT: This proposal should have been accepted. The concrete encased electrode is proven to be an effective grounding electrode. By deleting "if available" it more clearly states the intention of the section that all electrodes be utilized to form an effective grounding electrode system.

Many jurisdictions now amend this section of the NEC by deleting these words. The jurisdiction where I live does require the concrete encased electrode and it does not create an enforcement problem. Changes made by the code committees with less substantiation each code cycle always create some enforcement problems until the installers know the requirements being enforced. This proposal should be accepted.

DOBROWSKY: The proposal has merit and the concept should be pursued. A possible solution is to include a requirement in the building code (NFPA 5000) that requires making "rebar" accessible. Then, the NEC could require a connection to this accessible point.

JOHNSTON: The panel statement is directed to existing installations. It is understood that this requirement is not feasible for existing installations and the intent of this proposal was not directed in any way to existing installations. Generally, the Code is not retroactive. The word available as used in this section is creating inconsistencies in the field relative to which grounding electrodes are required to be used in electrical installations. The concrete encased grounding electrode is a proven effective electrode and is inherent to the construction of most buildings or structures and should be included in the grounding electrode system as such. The NEC style manual recommends not using the word "available" to avoid this very type of inconsistency in application and enforcement Code rules.

Comment on Affirmative:

BOKSINER: While the proposed requirement is not feasible for existing installations where all the electrodes are not available, it is feasible and desirable for new installations. The words "if available" should be changed to "if available in existing installations or if present on new installations." There is precedent in the NEC for a distinction between new and existing installations.

5-116 Log #1773 NEC-P05 **Final Action: Reject**
(250-50)

Submitter: Kenny Kuhn, K.K. Electric, Inc.

Recommendation:

None.

Substantiation:

Why not run an equipment-grounding conductor from the transformer to the main disconnect switch? Isolate the neutral like the other hot conductors and make equipment grounding a safer and less confusing installation?

Panel Meeting Action: Reject

Panel Statement:

The proposal does not comply with Regulations Governing Committee Projects 4-3.3(c) in that the submitter has not provided any recommended text.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-117 Log #2344 NEC-P05 **Final Action: Reject**
(250-50)

Submitter: Mike Friedmann Macomb, MI

Recommendation:

Add a second paragraph to the end of this section.
Separate grounding electrodes as described in 250.52 shall be installed with a minimum separation of 1.8 m (6 ft). Grounding electrodes as described in 250.52(A)(1) and (A)(3) shall be permitted to be spaced less than 1.8 m (6 ft) where the two electrodes are at an angle to each other greater than 45 degrees.

Substantiation:

In 250.56, rod, pipe, or plate electrodes are required to be spaced not less than 1.8 m (6 ft) apart. When other electrodes are spaced less than 1.8 m (6 ft) apart, the same loss of effectiveness will be lost. This rule should apply to all electrodes. In the case of a concrete encased electrode in a basement wall or building footing, it may not be practical to maintain this spacing and an exception needs to be available.

Panel Meeting Action: Reject

Panel Statement:

It is not practical or feasible to mandate spacing requirements for electrodes not installed by electrical craft persons. The spacing for electrodes under 250.52(A)(5) and (A)(6) are specified in 250.53(B).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-118 Log #3109 NEC-P05 **Final Action: Reject**
(250-50)

Submitter: Thomas J. Garvey, State of Wisconsin

Recommendation:

Revise the first sentence to read: Grounding Electrode System. If ~~available~~ present on the premises at each building...". (remainder of text to remain the same.)

Substantiation:

This section is interpreted to mean that if the electrical contractor shows up after the footings have been poured, the concrete encased electrode is no longer available. The net result in many cases, is two ground rod as the electrode system. The concrete encased electrode should be used if part of the building design.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 5-115 (Log #1559).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

BRETT: See my Explanation of Negative Vote on Proposal 5-115.
DOBROWSKY: The proposal has merit and the concept should be pursued. A possible solution is to include a requirement in the building code (NFPA 5000) that requires making "rebar" accessible. Then, the NEC could require a connection to this accessible point.

5-119 Log #1882 NEC-P05 **Final Action: Reject**
(250-50 Exception (New))

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Add a new Exception as follows:
Exception: Where an approved insulating section of water pipe is installed within 300 mm (1 ft) of the water pipe's entrance to the building, the metal under ground water pipe shall not be required to be used as a grounding electrode.

Substantiation:

The use of the metal under ground water pipe creates a parallel path for grounded conductor current. This path causes excessive EMF and also presents an electrical shock hazard to water workers. This proposal allows the designers of the electrical system to eliminate these possible hazards if they so choose. Current code requires that these hazards be created.

Panel Meeting Action: Reject

Panel Statement:

The panel maintains its position that all electrodes on the premises "if available" are required to be bonded together to form the grounding electrode system. The submitter does not include substantiation that clearly indicates that the proposed change increases electrical safety. If grounding electrodes on the premises are not bonded together, the possibility of differences of potential can exist between those that form the grounding electrode system and those that are isolated from the system. Also when events such as line surges and lightning strikes at the building or premises or in the vicinity of the building or structure, the potential on all conducting elements (grounding electrodes) in the earth should rise at the same potential thus reducing fire and shock hazards in or on the building.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-120 Log #309 NEC-P05 **Final Action: Reject**
(250-50(D) Exception (New))

Submitter: Mike Trainum, Ultramar Diamond Shamrock Golden Eagle Refinery

Recommendation:

Add an Exception to read as follows:
Exception: Stainless steel may be used when soil conditions cause excessive corrosion of copper.

Substantiation:

Copper corrodes at a high rate in an H2S and sulfur environment. This causes loss of grounding and causing frequent rebuilding of ground system.

Panel Meeting Action: Reject

Panel Statement:

The panel can not determine the correct section reference for this Proposal.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

BRENDER: Stainless steel electrodes are already permitted under 250.52(a)(5). This proposal unnecessarily adds pejorative terminology and calls for expertise on soil acidity. There are soil conditions that are very corrosive to stainless steel.

5-120a Log #409 NEC-P05 **Final Action: Reject**
(250-52(A)(1))

Submitter: Jeffrey A. Fecteau, City of Peoria, Arizona

Recommendation:

Revise text to read as follows:
Metal underground Water Pipe. A metal underground water pipe in direct contact with the earth for 3.0 m (10 ft) or more and exterior to the building or structure (including any metal well casing effectively bonded to the pipe) and electrically continuous (or made electrically continuous by bonding around insulation joints or insulating pipe) to the points of connection of the grounding electrode conductor and the bonding conductors. Underground metal water pipe under the building or structure shall not be used as an electrode or electrode conductor. Interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall not be used as a part of the grounding electrode system of as a conductor to interconnect electrodes that are part of the grounding electrode system.

Substantiation:

This will clarify what underground metal water pipe shall be used as a grounding electrode when available. Currently, there is confusion as to whether or not underground metal water pipe under the building or structure is effectively grounded. Also, if it enters the building in multiple locations, where does the 1.52 m (5 ft) dimension apply?
My understanding of the intent for using this electrode is because of its ability to create a ground connection to the earth. To accomplish this moisture is essential. Typically the dirt under the concrete slab of the building or structure is not natural but imported ABC gravel. also there is a moisture/vapor barrier installed. Now install a weather tight building over this installation and you eliminate the ability of this system to be in contact with moist earth, which is needed for a good grounding electrode to operate properly.
Note: Supporting material is available for review at NFPA headquarters.

Panel Meeting Action: Reject

Panel Statement:

The panel concludes that as long as the metal pipe is underground and for ten feet or more in contact with the earth, then the pipe is considered an electrode as specified in 250.52(A)(1).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-121 Log #2073 NEC-P05 **Final Action: Reject**
(250-52(A)(1))

Submitter: Mark T. Rochon, City of Salem Electrical Department

Recommendation:

Add text to read as follows:
Interior metal water piping located on the supply side of the water main shut off and not more than 1.52 m (5 ft) from the point of entrance to the building shall not be used as part of the grounding electrode system or as a conductor to interconnect electrodes that are part of the grounding electrode system.

Substantiation:

Plumbers are disconnecting the grounding electrode when replacing water main shut off, and not connecting them back up, also possible electrocution is possible if the plumbers are caught between the connection.

Panel Meeting Action: Reject

Panel Statement:

The submitter concerns are addressed in 250.53(D)(1) and in 250.68(B).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-122 Log #3453 NEC-P05 **Final Action: Reject**
(250-52(A)(1) Exception)

Submitter: Charles M. Trout, Maron Electric Co. Inc.

Recommendation:

Delete this exception in its entirety.

Substantiation:

The National Electrical Code is prescriptive code. To say "where the conditions of maintenance and supervision ensure that only qualified persons service the installation," is a performance requirement. Without prescriptive requirements indicating whether this qualified person is an employee of the owner of the premises or is a separately contracted person and the Authority Having Jurisdiction has a means of verification of the continued employment of the qualified person and whether the qualified person has been verified by the authority having jurisdiction as meeting the definition of a qualified person as shown in the definitions of this Code no prescriptive requirements have been followed.

To permit relaxation of the safety requirements of this Code without establishing a positive guarantee that the safety of persons and property is indisputably assured is a reprehensible act.

Panel Meeting Action: Reject

Panel Statement:

The submitter did not provide any evidence of a problem. The present practice has been successfully used for many years.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

TOOMER: There should be more controls on the qualified person as to their training and knowledge of the system for the safe maintenance of it.

Add:

Documentation of their qualifications and safety training of the system must be on file with the local authority having jurisdiction.

5-123 Log #410 NEC-P05 **Final Action: Reject**
(250-52(A)(2))

Submitter: Jeffrey A. Fecteau, City of Peoria, Arizona

Recommendation:

Revise text to read as follows:

The metal frame of the building or structure, where effectively grounded using an electrode type as specified in 250.52(A)(3) through (A)(6), or bolted, welded connections to the reinforcing steel in exterior foundations/footings, or the structural steel is itself concrete encased at or near the bottom of the footing/foundation which is in direct contact with the earth.

Substantiation:

This will clarify the common misconception that all structural steel is effectively grounded. Where the installer will attempt to use structural steel in accordance with 250.30(A)(4)(1), when in fact the structural steel is only bonded in accordance with 250.104(C).

Note: Supporting material is available for review at NFPA headquarters.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 5-126 (Log #2959).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: The panel action should be accept in principle with revised text as a minimum. The submitter clearly stated there was a problem and provided possible solutions with photographic evidence. The present language is vague and does not provide for inspection verification during construction and definitely not after. The building structural metal is widely used as the "preferred grounding electrode" for numerous separately derived systems when its suitability as an electrode is in question. See also the comments on proposals 5-124 and 5-126.

Comment on Affirmative:

RAPPAPORT: See my Comment on Affirmative on Proposal 5-126.

5-124 Log #1555 NEC-P05 **Final Action: Reject**
(250-52(A)(2))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise 250.52(A)(2) as follows
250.52 Grounding Electrodes.
(A) Electrodes Permitted for Grounding.
(1) Metal Underground Water Pipe. A metal underground water pipe in direct contact with the earth for 3.0 m (10 ft) or more (including any metal well casing effectively bonded to the pipe) and electrically continuous (or made electrically continuous by bonding around insulating joints or insulating pipe) to the points of connection of the grounding electrode conductor and the bonding conductors. Interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall not be used as a part of the grounding electrode system or as a conductor to interconnect electrodes that are part of the grounding electrode system.
Exception: In industrial and commercial buildings or structures where conditions of maintenance and supervision ensure that only qualified persons service the installation, interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall be permitted as a part of the grounding electrode system or as a conductor to interconnect electrodes that are part of the grounding electrode system, provided that the entire length, other than short sections passing perpendicular through walls, floors, or ceilings, of the interior metal water pipe that is being used for the conductor is exposed.
(2) Metal Frame of the Building or Structure. The structural steel that is interconnected to form a steel frame of building or structure and establishes connection to the earth. ~~The metal frame of the building or structure where effectively grounded.~~

Substantiation:

This revision is aimed at clarifying the confusion in the field with the term effectively grounded. Grounding electrodes listed in 250.52 are all conducting elements that establish a connection to the earth. Rod, pipe, plate, water pipe, other structures, concrete encased, etc. There are situations that arise in the field where the building steel might not establish a conducting connection directly to the earth or by an effective connection through the rebar system to the concrete-encased electrode at the bottom of the building footing. The revision should help clarify when building steel can be used as permitted by 250.52 for a grounding electrode. Some feel that if the building steel is not connected to the earth directly or through an effective connection by the concrete-encased electrode, that installing a conductor to a rod from the steel renders the steel as an electrode. Is it intended by CMP-5 that the electrodes that must be used for the grounding electrode system in 250.50, qualify as an electrode before a conductor is connected to it, or is the steel considered effectively grounded when connected to the earth in the manner indicated. The language proposed may not be totally adequate and may need to be adjusted by the panel for clarity.

Panel Meeting Action: Reject

Panel Statement:

The revised wording does not add clarity. See panel action and statement on Proposal 5-126 (Log #2959).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: The panel action should be accept in principle with revised text as a minimum. The submitter clearly stated there was a problem and provided possible solutions. The present language is vague and does not provide for inspection verification during construction and definitely not after. The building structural metal is widely used as the "preferred grounding electrode" for numerous separately derived systems when its suitability as an electrode is in question. The proposed text at least provided the requirement that the structural metal had to have some sort of connection to earth. As stated in the substantiation, every other electrode is detailed in how it is to be in contact with the earth (dirt) for a specified length, at specified depths, have cross sectional areas in contact with soil etc. The only "electrode" that is not defined is the structural metal frame. See also the comments on proposals 5-123 and 5-126.

5-125 Log #2731 NEC-P05 **Final Action: Reject**
(250-52(A)(2))

Submitter: Melvin K. Sanders, TECo., Inc.

Recommendation:

Add new sentence:
"Metal framing member fastening hardware (i.e. bolts, fasteners, rivets or similar) shall not be depended upon as part of the effective grounding path."

Substantiation:

These fasteners and the structural framing member joints are coated or painted with a rust preventive that impairs their electrical conductivity. Non-reversible bonding jumpers should be installed to provide a low resistant path across these joints and to insure they maintain their integrity after a building is completed. If significant ground fault current flows across these fasteners, their mechanical properties may be impaired and compromise the building structural integrity.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not provided substantiation or technical data such as testing that demonstrates a need for bonding jumpers around every structural steel fastener utilized for steel erection and serving as a grounding electrode. This is commonly used as an electrode and there is no evidence of a problem.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-126 Log #2959 NEC-P05 **Final Action: Reject**
(250-52(A)(2))

Submitter: Charles Mello, Electro-Test, Inc.

Recommendation:

Replace the existing text with the following:
(2) Metal Frame of the Building or Structure. ~~The metal frame of the building or structure, where effectively grounded.~~ Structural steel that is in direct contact with the earth, or has a direct metallic path to the footing reinforcing bars, or at least 20 feet of 4 AWG bare copper conductor, encased by at least 2 inches of concrete in direct contact with the earth in the base of the footing or foundation for that part of the steel structure. Where the copper conductor is used, it shall be bonded to the structural steel in an accessible location by exothermic welding, a clamp assembly listed for the purpose of other approved means. Where the reinforcing bars are used, all the bars shall be made electrically continuous by the use of tie wires and the structural steel mounting bolts shall be made electrically continuous to the steel reinforcing bars by tack welding or other approved means.

Substantiation:

The present wording for building steel to be suitable as an electrode is open to wide variances in interpretation and does not provide a means for the inspector to readily determine if the structural steel is "effectively grounded". The revised wording would provide guidance on the structural steel being a stand-alone grounding electrode and gives direction for the installation and inspection that can be readily accomplished visually.

Panel Meeting Action: Reject

Panel Statement:

There are numerous methods to ground structural building steel. The code is not intended to be used as design manual.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: The panel action should be accept in principle with revised text as a minimum. The submitter clearly stated there was a problem and provided possible solutions that would clearly state what constituted structural metal frame members as a grounding electrode. The present language is vague and does not provide for inspection verification during construction and definitely not after. The building structural metal is widely used as the "preferred grounding electrode" for numerous separately derived systems when its suitability as an electrode is in question. To meet the present wording one could drive one ground rod into totally unknown soil and bond with a 6 AWG to the structural metal and then call the structural metal frame "effectively grounded". This clearly would be totally inadequate on a large metal frame structure to serve as the sole electrode (structural metal has no minimum earth resistance or requirements for additional electrodes) for the service and for all the separately derived systems. The proposed text at least provided the requirement that the structural metal had to have some sort of connection to earth, either directly or through metallic connection that is concrete encased. See also the comments on proposals 5-123 and 5-124.

Comment on Affirmative:

RAPPAPORT: This proposal has merit because it provides some direction as to what constitutes an "effectively grounded" metal frame. This proposal, however, is too restrictive by not permitting other acceptable means of intentionally connecting to the earth.

5-127 Log #411 NEC-P05 **Final Action: Reject**
(250-52(A)(3))

Submitter: Jeffrey A. Fecteau, City of Peoria, Arizona

Recommendation:

Revise text to read as follows:
Concrete-Encased Electrode. An electrode encased by at least 50 mm (2 in.) of concrete, located within and near the bottom of an exterior concrete foundation or footing that is in direct contact with the earth, consisting of at least 6.0 m (20 ft) of one or more bare or zink galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (1/2 in.) in diameter, or consisting of at least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG. Reinforcing bars shall be permitted to be bonded together by the usual steel tie wires or other effective means.

Substantiation:

This grounding electrode requires the ability to draw moisture from the earth to be effective. This ability is hindered if not completely halted when installed in an interior footing. Typically, there is a vapor/moisture barrier installed between the concrete slab and dirt below, also the fact that it is installed under the interior of a weather tight structure will prevent the chance for moisture to accumulate. Refer to the IEEE Conference Paper, CP-61-978, this electrode was not installed or tested on an interior footing.

Panel Meeting Action: Reject

Panel Statement:

No technical substantiation has been submitted that all interior, underground, concrete encased electrodes are not suitable as an electrode. There is no substantiation that the language, that has been in use for many years, is flawed.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-128 Log #1856 NEC-P05 **Final Action: Reject**
(250-52(A)(5))

Submitter: Andre R. Cartal, Princeton Borough Building Dept.

Recommendation:

Add new text to read as follows:
Rod and pipe electrode systems shall provide at least two electrodes spaced not less than 1.8 m (6 ft) apart. These electrodes shall not be less than 2.5 m (8 ft) in length and shall consist of the following materials.
Follow with (a) and (b).

Substantiation:

Requiring at least two electrodes will substantiate the deletion of 250.56. Please see related substantiation in proposal to delete 250.56.

Panel Meeting Action: Reject

Panel Statement:

The code applies to all geographical areas. There are areas in which a single rod will have a resistance to ground of less than 25 ohms and should be permitted.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BOKSINER: This Proposal should be accepted and 250.56 should be deleted. In fact, as the submitter states, 250.56 does not make much sense. There is no technical justification to require a specific resistance values for safety purpose in a premises wiring system served by multi-grounded power distribution system. The only plausible rationale for this rule is to provide a crude metric to determine the quality of contact between the electrode and the earth. However, it is a poor metric of contact quality since it does not take into account earth resistivity. A better way to help assure contact quality is to require two rod electrodes under all soil conditions.

In practice, a common way to meet 250.56 is to install two rods in all cases. An accurate measurements of rod resistance is difficult and time-consuming. It is doubtful that many such measurements are performed accurately. It is easier to meet the requirements by installing a second rod. This is the practice in many telecommunication companies and also appears to be a common practice among installers (see, for example, the article Who Cares About 25 Ohms or Less? in EC&M April 1, 2000 issue).

250.56 causes enormous confusion among the users of the Code. A common misinterpretation is that the Grounding Electrode System must have a resistance to ground of 25 Ohms or less. Another common misinterpretation is that 25 Ohms has a special significance. The use of 25 Ohms as a target for grounding resistance has spread to other fields of electrical engineering. Thus, deletion of 250.56 and corresponding change in this proposal would eliminate confusion and enhance safety without imposing undue hardship on installers.

5-129 Log #3392 NEC-P05 **Final Action: Accept in Principle**
(250-52(A)(5))

Submitter: Roger J. Montambo, Glavan Industries, Inc.

Recommendation:

Add new text to read as follows:
Rod and Pipe Electrodes. Rod and pipe electrodes shall not be less than 2438 mm (8 ft) in length and shall consist of the following materials:
1. Electrodes of pipe or conduit shall not be smaller than metric designator 21 (trade size 3/4 in. nominal) and, whether of iron or steel, shall have the outer surface hot-dip galvanized.
2. Electrodes of rods of iron or steel shall be coated with copper or zinc, and shall comply with the requirements of ANSI/NEMA GR-1 specification, latest revision.
3. Stainless steel rods shall comply with the finished diameter requirements of copper clad rods specified in the ANSI/NEMA GR-1 specification, latest revision.

Substantiation:

Significant confusion persists over dimensional tolerances, inaccuracies in conversions between metric and English units, qualification for "listed" materials, and where pipe and stainless-steel rods fit in these criteria. Many national codes consider dimensions to be nominal and not necessarily specific, allowing a nationally recognized specification to govern. There is confusion in the standard between the use of "hard" numbers and "nominal" trade size numbers, and there is no mention of tolerances which must be included in a standard used by manufacturers in production. There is also much misunderstanding regarding the use of the terms "ferrous" and "non-ferrous" and their meaning. Frequently inspectors, manufacturers and consumers have interpreted 250.52(A)(5) differently, resulting in inconsistent application of the NEC Code and resulting use of non-conforming products.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Revise (5) to read as follows:
(5) Rod and Pipe Electrodes. Rod and pipe electrodes shall not be less than 2.5 m (8 ft) in length and shall consist of the following materials.
(a) Electrodes of pipe or conduit shall not be smaller than metric designator 21 (trade size 3/4) and, where of iron or steel, shall have the outer surface galvanized or otherwise metal-coated for corrosion protection.
(b) Electrodes of rods of iron or steel shall be at least 15.87 mm (5/8 in.) in diameter. Stainless steel and galvanized rods less than 16 mm (5/8 in.) in diameter, nonferrous rods, galvanized rods or their equivalent shall be listed and shall not be less than 13 mm (1/2 in.) in diameter.
FPN: For further information on ground rods, see ANSI/NEMA GR1-2001, Grounding Rod Electrodes and Grounding Rod Electrode Couplings.

Panel Statement:

Galvanized rods were added to the list of rod and pipe electrodes with a listing requirement for 1/2 in. trade size. The panel concludes that this meets the submitters intent. The Fine Print Note was added to provide guidance to the users.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-130 Log #231 NEC-P05 **Final Action: Reject**
(250-52(A)(5)(a))

Submitter: John M. Vargo, Vargo Electric

Recommendation:

Delete text as follows:
(5) Rod ~~and Pipe~~ Electrodes. Rod ~~and pipe~~ electrodes shall not be less than 2.5m (8 ft) in length and shall consist of the following materials:
~~(a) Electrodes of pipe or conduit shall be smaller than metric designator 21 (trade size 3/4) and, where of iron or steel shall have the outer surface galvanized or otherwise metal-coated for corrosion protection.~~

Substantiation:

Pipe, conduit and rods of iron or steel are not labeled or listed for use as electrodes and as such are contrary to the requirements of sections 90.7 and 110.3.

Panel Meeting Action: Reject

Panel Statement:

The proposal removes pipes from 250.52(A) as a permitted electrode without adequate substantiation. The substantiation provided indicates that electrodes are required to be listed for the purpose. This is not a current requirement for the electrodes permitted for grounding in 250.52(A).
The Code also permits other underground structures in 250.52(A)(7) as electrodes and those are not required to be listed. The listing requirement does come into play for the stainless steel rods less than 16mm (5/8 in.) in diameter. No substantiation for adding the restriction to this section was provided.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-131 Log #232 NEC-P05 **Final Action: Reject**
(250-52(A)(5)(b))

Submitter: John M. Vargo, Vargo Electric

Recommendation:

Delete text as follows:
(b) ~~Electrodes of rods of iron or steel shall be at least 15.87 mm (5/8 in.) in diameter.~~ Stainless steel rods less than 16 mm (5/8 in.) in diameter, nonferrous rods, or their equivalent shall be listed and shall not be less than 13 mm (1/2 in.) in diameter.

Substantiation:

Rods of iron or steel are not labeled or listed for use as electrodes and as such are contrary to the requirements of sections 90.7 and 110.3.

Panel Meeting Action: Reject

Panel Statement:

Presently, there is no requirement for the electrodes consisting of iron or steel rods larger than 1/2 in. to be listed. Section 90.7 and 110.3 do not require all electrical products to be listed.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-132 Log #1425 NEC-P05 **Final Action: Reject**
(250-52(A)(5)(c))

Submitter: James J. Mercier, Texas Department of Transportation - Bridge Division

Recommendation:

Add new text to read as follows:
Research has been presented that warns that stainless steel is very susceptible to corrosion in many soil conditions. Extreme caution should be used with proper soil analysis when this type of rod is used.

Substantiation:

We are seeing plans submitted with a specification for stainless steel ground rods. Such a specification is usually made by an Electrical Engineer with no understanding of soil properties but with a mistaken belief that stainless steel is better in all situations. As this note from NFPA 780 correctly states, it is not. When we attempt to get the Engineer to change the plans, the response is usually that stainless steel is approved by the NEC for ground rods and therefore must be suitable.

Panel Meeting Action: Reject

Panel Statement:

Various option are allowed within the NEC. In selecting proper rod material, consideration should be given to the soil conditions.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

RAPPAPORT: This type of comment is appropriate for a FPN with a reference to another NFPA document. The Submitter's substantiation is correct. There are some soil conditions where a stainless steel rod will corrode rapidly.

5-133 Log #1857 NEC-P05 **Final Action: Reject**
(250-52(A)(6))

Submitter: Andre R. Cartal, Princeton Borough Building Dept.

Recommendation:

New title and first sentence. Remainder of section remains the same.
Plate electrode systems shall provide at least two electrodes spaced not less than 1.8 m (6 ft) apart.

Substantiation:

Requiring at least two electrodes will substantiate the deletion of 250.56. Please see related substantiation for proposal to delete 250.56.

Panel Meeting Action: Reject

Panel Statement:

The code applies to all geographical areas. There are areas in which a single plate electrode will have a resistance to ground of less than 25 ohms and should be permitted.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BOKSINER: See my Explanation of Negative ballot for Proposal 5-128.

5-134 Log #1617 NEC-P05 **Final Action: Accept**
(250-52(A)(7))

Submitter: Lanny Hughes, Washington State Department of Labor & Industries

Recommendation:

Revise 250.52(A)(7) to include underground metal well casings to read as the following:
250.52(A)(7) Other Local Metal Underground Systems or Structures. Other local metal underground systems or structures such as piping systems, underground tanks and underground metal well casings, not effectively bonded to a metal water pipe.

Substantiation:

By including a well casing described above to 250.52(A)(7), it would more clearly be defined as an Other Local Metal Underground Systems and not as an underground metal water pipe, as in 250.52(A)(1), thereby eliminating the requirement in 250.53(D)(2), to additionally to install a supplement electrode.
Many Authorities Having Jurisdiction are interpreting a stand-alone well casing (connected to PVC pipe) as an underground metal water pipe system, because it is mentioned in 250.52(A)(1), (when it is effectively bonded to a metal underground water pipe) thus requiring a Supplemental Electrode.
A metal well casing that is not effectively bonded to a metal water pipe should be able to stand on its own merit as an grounding electrode without the requirement of a supplement electrode.
By placing it under 250.52(A)(7), it would not be required to be used as an electrode if available, only as an option if electrodes specified in 250.52(A)(1) through 250.52(A)(6) are not available, as mentioned in 250.50.
Well casings are normally the best electrodes available. They either meet or exceed the code requirements for electrodes. The Dept. of Ecology requires at least 20 ft of 6 in. metal casing, (2 ft above grade plus 18 ft below grade) for protection from damage. The corrosion protective coating on new well casing is so thin that most of it is scrapped off when it is driven into the ground. Most casings will rust below grade thus increasing its continuity to earth.
Recently, I have inspected several cell sites in sandy locations that have not been able to attain the 5 ohms or less to earth ground, as required by the Telecom industry specifications.
These sites all have an extensive ground grid system consisting of at least 5 or more copper ground rods and hard drawn tinned copper electrode conductor. The only way they were able to attain the required 5 ohms or less, as required, was to run an electrode conductor to a nearby well casing. After using the well casing as an electrode, they measured 0 ohms from the cell site to earth ground (Actual measurements could be submitted if necessary).

Panel Meeting Action: Accept

Editorially change the proposed text to read:
"Underground metal well casings which are not effectively bonded to a metal water pipe."

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-135 Log #1512 NEC-P05 **Final Action: Accept in Principle**
(250-52(B)(1))

Submitter: George R. Corron, 3D

Recommendation:

Add FPN to 250.52(B)(1) stating:
"This article does not prevent the required bonding of the gas piping system required by Article 250.104(B)."

Substantiation:

Add FPN to 250-52(B)(1) stating:
"This article does not prevent the required bonding of the not be used as grounding electrode. 250.104(B) states that the gas piping system is required to be bonded. This is leading to confusion in inspection techniques. I sought clarification from VA state regarding this problem several years ago, but is again being misinterpreted as requiring isolation of gas pipe.
Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Revise the recommendation to read as follows:
Add FPN to 250.52(B)(1) stating:
"FPN: See 250.104(B) for bonding requirements of gas piping."

Panel Statement:

The language in this FPN is consistant with other FPN's in Article 250.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-136 Log #1640 NEC-P05 **Final Action: Accept in Principle**
(250-52(B)(1), FPN (New))

Submitter: George R. Corron, 3D

Recommendation:

Add FPN to 250.52(B)(1) stating: "This article does not prevent the required bonding of the gas piping system required by Article 250.104(B)".

Substantiation:

250.104(B) states that the gas piping system is required to be bonded. This is leading to confusion in inspection techniques. I sought clarification from VA state regarding this problem several years ago, but it is again being misinterpreted as requiring isolation of gas pipe.

NOTE: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement in Proposal 5-135 (Log #1512).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Sequence Number 5-137 is not used.

5-138 Log #312 NEC-P05 **Final Action: Reject**
(250-53(E))

Submitter: John M. Vargo, Vargo Electric

Recommendation:

Revise text to read as follows:

"Where the supplemental electrode is a rod, pipe, or plate electrode, that portion of the bonding jumper that is the sole connection to the supplemental grounding electrode shall not be required to be larger than 6 AWG copper." (~~or 4 AWG aluminum wire.~~)

Substantiation:

Rod, pipe and plate electrodes are all installed in the earth. Section 250.64(A) specifically prohibits aluminum conductors from terminating within 450 mm (18 in.) of the earth.

Panel Meeting Action: Reject

Panel Statement:

The panel concludes that the proposal introduces a restriction without substantiation that would prohibit installations that otherwise could comply with other minimum provisions in the Code.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-139 Log #1646 NEC-P05 **Final Action: Reject**
(250-53(E))

Submitter: Michael Cohagan Colorado Springs, CO

Recommendation:

Delete text as follows:

"...~~or 4 AWG aluminum wire~~."

Substantiation:

Prohibited by 250.64(A).

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement to Proposal 5-138 (Log #312).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-140 Log #1561 NEC-P05 **Final Action: Accept**
(250-54)

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.54 as follows:
250.54 Supplementary Grounding Electrodes.
Supplementary grounding electrodes shall be permitted to be connected to the equipment grounding conductors specified in 250.118 and shall not be required to comply with the electrode bonding requirements of 250.50 or 250.53(C) or the resistance requirements of 250.56, but the earth shall not be used as an ~~the sole equipment grounding conductor~~ effective ground-fault current path as specified in 250.4(A)(5) and 250.4(B)(4).

Substantiation:

The revision is needed to remove the term "sole equipment grounding conductor" from this performance provision in Article 250. The earth should not be used at all as an equipment grounding conductor. The revision enhances what is intended by these requirements. By removing the reference and relation to the equipment grounding conductor and earth from this section, should help in understanding and proper application of these performance requirements. It is understood that the earth will be in the grounding circuit and is a high impedance path in the grounding circuit. It should be clarified even further that the equipment grounding conductor is an intentionally constructed effective ground-fault current path and the earth is not and never should be considered as such whether the sole path or otherwise. The Revision to this section also establishes a consistent tie between the performance criteria in 250.4 and this section.

Panel Meeting Action: Accept

Editorial: Underline the additional word "an".

Panel Statement:

See panel action on Proposals 5-53 (Log #2958) and 5-54 (Log #1558).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON: See affirmative statement to proposal 5-52. This proposal is consistent with clarifying performance functions of the "effective ground-fault current path" and also removes the term "sole equipment grounding conductor" from this section to further emphasize that the earth shall not be used as a sole equipment grounding conductor path or otherwise.

5-141 Log #3155 NEC-P05 **Final Action: Reject**
(250-54)

Submitter: Eric Stromberg, The Dow Chemical Company

Recommendation:

Revise text as follows:
Change the word "Supplementary" to "Additional". Change negative wording of last sentence to positive wording. Proposed paragraph would read as follows:
Additional grounding electrodes shall be permitted to be connected to the equipment grounding conductors specified in 250.118 and shall not be required to comply with the electrode bonding requirements of 250.50 or 250.53(C) or the resistance requirements of 250.56, but the equipment grounding conductors shall also be connected to the equipment grounding system as required by 250.50, 250.53(C), and 250.56.

Substantiation:

The word "Supplementary" is too close to the word "Supplemental". This paragraph is not referring to a supplemental electrode but could easily be construed as such. The paragraph states that an additional electrode can be connected to the equipment grounding conductors. Careful inspection of this sentence reveals the plural conductors. However, without knowing the intent behind this paragraph, it could be construed to mean that an additional ground tool could be connected to a single piece of equipment and that this ground rod doesn't have to be a part of the rest of the system. I have had several discussions with people who thought that this paragraph was for the purpose of allowing, isolated ground rods for sensitive electronic equipment. After I have demonstrated the intent of the code from reference to other sections and have convinced the other party, invariably the statement is made that this paragraph should be reworded for clarity. The above could also be accomplished by the addition of a Fine Print Note. Something like the following:
FPN: The above paragraph allows the addition of Grounding Electrodes to the equipment grounding conductor system. Since these electrodes are in addition to the requirements of the code, they are not regulated by the code. This paragraph is not to be construed as allowing isolated grounding electrodes that are not bonded to the grounding system.

Panel Meeting Action: Reject

Panel Statement:

No substantiation has been provided to indicate there is a problem with the current wording. The panel concludes that replacing the word "supplementary" with the word "additional" does not improve clarity to this section. The words supplementary and additional by definition mean the same thing.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

DOBROWSKY: The submitter has a good suggestion. The present terms (supplemental and supplementary) are too similar.

5-142 Log #206 NEC-P05 **Final Action: Reject**
(250-56)

Submitter: Ben Rhode North Branch, MI

Recommendation:

At the end of this paragraph add the following: and not closer than 1.8 m (6 ft) from any other grounding electrode. The paragraph will then read:

250.56 resistance of Rod, Pipe, and Plate Electrodes. A single electrode consisting of a rod, pipe, or plate ... they shall not be less than 1.8 m (6 ft) apart, and not closer than 1.8 m (6 ft) from any other grounding electrode.

Substantiation:

The second ground rod is required to be located not closer than 1.8 m from the first ground rod, but there is no requirement the rod, plate, or pipe electrode be 1.8 m from the water pipe or any other electrode.

Panel Meeting Action: Reject

Panel Statement:

The requirements for spacing between electrodes are intended for the rod, pipe, or plate types only as indicated in 250.53(B). The submitter has not provided substantiation to indicate that the minimum spacing requirement should apply to all electrodes permitted for grounding by 250.52(A).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-143 Log #293 NEC-P05 **Final Action: Reject**
(250-56)

Submitter: Bryan P. Holland, Holland Electric

Recommendation:

Revise text to read as follows:

A single electrode consisting of a rod, pipe, or plate that does not have a resistance to ground of 25 ohms or less shall be augmented by ~~one~~ additional electrodes of any of these types until resistance to ground of 25 ohms or less is achieved.

Substantiation:

I believe the intent of the code is to achieve a resistance to ground of 25 ohms or less. The code is not clear what to do if the one additional electrode still does not reduce the resistance to ground to the required 25 ohms or less.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not provided substantiation to include the restrictions proposed. Single electrodes indicated in this section must meet the 25 ohm provisions of Section 250.56. One additional electrode is required where this resistance value exceeds 25 ohms. The panel affirms that it is not required to install multiple rod, pipe, or plate electrodes until 25 ohms or less resistance is achieved. It is not the intent of this section to achieve a resistance of 25 ohms or less due to varying soil conditions.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-144 Log #1858 NEC-P05 (250-56) **Final Action: Reject**

Submitter: Andre R. Cartal, Princeton Borough Building Dept.

Recommendation:

Delete 250.56.

Substantiation:

This provision has been in the NEC since at least the 1920's. In my experience it has been generally ignored by the majority of field inspectors. Note that the section sets the maximum resistance level at 25 OHMS, but deletes this level when an additional electrode is added. There is no safety rationale in setting a resistance standard for the system and then ignoring it. As an example, we had a development in NJ consisting of 200 plus homes, the grounding system included a single rod meeting 250.52(A)(5), the water system was plastic. The installation was reinspected by a state official and was cited in violation of 250.56, the contractor then hired a testing agency to come in and test each installation. The test results averaged above 230 OHMs and the contractor was required to install an additional electrode per 250.56. At this point, the home owner's association demanded another test which was performed with the average test result still in the 200 OHM range and way above the 25 OHM level of safety that the NEC references. How is it possible for the field electrical inspector to explain in safety terms to a layman the installation is now in compliance, when the NEC sets a level of 25 OHMS or less? Who will be held liable if it can be proved that damage caused was a result of excess resistance? Deletion of this section will require a change in 250.52(A)(5) to require at least 2 electrodes (Proposal submitted).

Panel Meeting Action: Reject

Panel Statement:

Insufficient substantiation has been provided to remove this section from the NEC. The panel concludes that deleting Section 250.56 reduces current minimum requirements. The panel affirms that the provisions in 250.56 are needed for installations using rod, pipe, or plate electrodes. See panel action and statement on Proposals 5-128 (Log #1856) and 5-133 (Log #1857).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

BOKSINER: See my Explanation of Negative ballot for Proposal 5-128.

MELLO: The panel action should be to accept along with the provisions provided in two other proposals to revise the definition of acceptable rods, pipe or plate electrode installations. The submitter provided good substantiation on an all to common situation, where a resistance value to earth has been established but makes no sense when it is easily side stepped. There are limited areas in the country that might meet the resistance requirement and maybe some more that might make it during the rainy season, but for the majority, a single rod, pipe or plate cannot meet the requirement. It would seem to be far better to just require the rod, pipe or plate to be provided with one additional electrode which could be any of the other electrodes or another rod, pipe or plate, then get away from this unsupportable resistance value. The panel statement that removal of this section reduces current minimum requirements is false in that the proposed alternative of rods, pipes and plates always having an additional electrode, already meets this minimum requirement.

5-145 Log #1562 NEC-P05 (250-58) **Final Action: Reject**

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise text as follows:

250.58 Common Grounding Electrode.

Where an ac system is connected to a grounding electrode in or at a building as specified in 250.24 and 250.32, the same electrode shall be used to ground conductor enclosures and equipment in or on that building. Where separate services supply a building and are required to be connected to a grounding electrode, the same grounding electrode shall be used.

Two or more grounding electrodes that are effectively bonded together shall be considered as a single grounding electrode system in this sense.

Substantiation:

None provided.

Panel Meeting Action: Reject

Panel Statement:

No proposed change in text was provided.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-146 Log #2479 NEC-P05 **Final Action: Reject**
(250-58)

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Delete this section.

Substantiation:

It appears that 250.24(C) and 250.50 already cover this.

Panel Meeting Action: Reject

Panel Statement:

The current requirements in 250.58 are needed. Removing this section could lead to conditions where separate electrodes for different services or other systems might not be bonded together. The direct wording addressing multiple services on one building or structure in Section 250.58 should be retained.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-147 Log #2671 NEC-P05 **Final Action: Accept**
(250-58)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Revise existing Section 250.58 as follows:

250.58 Common Grounding Electrode.

Where an ac system is connected to a grounding electrode in or at a building or structure, ~~as specified in 250.24 and 250.32,~~ the same electrode shall be used to ground conductor enclosures and equipment in or on that building or structure. Where separate services, feeders or branch circuits supply a building and are required to be connected to a grounding electrode(s), the same grounding electrode(s) shall be used.

Two or more grounding electrodes that are effectively bonded together shall be considered as a single grounding electrode system in this sense.

Substantiation:

For adding "or structure," some structures are not buildings but electrical systems may be required to be grounded at these structures. Several other sections of Article 250 appropriately use the phrase "… building or structure…"

For deleting the reference to 250.24 and 250.32, it seems the specific reference is not needed as 250.24 requires the connection of the electrical system to a grounding electrode system and 250.20(D) requires specific separately derived systems to be grounded in accordance with 250.30. By deleting the references, this section will also apply to electrical systems at separate buildings that are required to be grounded in accordance with 250.32.

Finally, for adding "feeders or branch circuits" to the section, buildings and structures are permitted to be supplied by one or more service, feeder or branch circuit. The second sentence needs to be revised to recognize this fact.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-148 Log #2135 NEC-P05 **Final Action: Reject**
(250-64(A))

Submitter: Bryan Sakocius Grand Rapids, MI

Recommendation:

In the last sentence of this section, add the words bare or insulated before the word aluminum and electrode before the word conductors so the last sentence reads as follows:

Where used outside, bare or insulated aluminum ~~or~~ and copper-clad aluminum grounding electrode conductors shall not be terminated within 450 mm (18 in.) of the earth.

Substantiation:

This rule applies to both bare and insulated aluminum and copper-clad aluminum grounding electrode conductors, but because it is not specifically stated, the section is sometimes interpreted as applying only to bare conductors. This is such an important issue that it needs to be made undisputedly clear. The term electrode needs to be added because this section may be interpreted as also applying to equipment grounding conductors even though the section states grounding electrode conductors.

Panel Meeting Action: Reject

Panel Statement:

The proposed changes do not add clarity to this section. The requirements of Section 250.64(A) address the insulated and bare aluminum and copper-clad aluminum conductor termination location requirements.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Explanation of Negative:

5-149 Log #163 NEC-P05 **Final Action: Reject**
(250-64(B))

Submitter: W. Creighton Schwan Hayward, CA

Recommendation:

250.64(B). In lines 10 through 15, add to both lists of raceways (for enclosing grounding electrode conductors), "flexible metal conduit", following "electrical metallic tubing".

Substantiation:

Flex is certainly the equivalent to cable armor, which is permitted, for protection of grounding electrode conductors against physical damage. Flex is commonly used for this purpose. If there is some technical reason for not including it, will the Panel please advise.

Panel Meeting Action: Reject

Panel Statement:

No substantiation was provided to add flexible metal conduit to this section. Flexible metal conduit is not permitted to be used where subject to physical damage as specified in 348.12(7). Armored grounding electrode conductors are recognized for this purpose.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: The panel action should have been accept in principle as a minimum. The panel statement is incorrect in that there was substantiation to add flexible metal conduit to this section. It is true that flexible metal conduit is not permitted where subject to physical damage, but neither is electrical metallic tubing or non-metallic rigid conduit yet these raceways are on the permitted list. There is no reason that flexible metal conduit applied in the right situations would not be just as good as EMT or RNMC where properly applied in accordance with the applicable raceway articles. See also comment on proposal 5-152.

5-150 Log #892 NEC-P05 **Final Action: Accept in Principle**
(250-64(B))

Submitter: James M. Daly, General Cable

Recommendation:

Revise the second sentence as follows:
A 4 AWG copper or aluminum or larger conductor shall be protected ~~if exposed to~~ from ~~severe~~ physical damage.

Substantiation:

There is no distinction between "physical damage" and "severe physical damage" in the Code; the conductor should not be subjected to any physical damage.
3.2.5.4 of the 2001 NEC Style Manual also shows "protection against physical damage" as the preferred terminology.
3.2.1 of the 2001 NEC Style Manual states that: "The NEC shall not contain references or requirements that are unenforceable or vague." The term "severe" is subjective and vague and should not be used if it can be avoided.

Panel Meeting Action: Accept in Principle

Reword the Section to incorporate the proposed revisions as follows:
B) Securing and Protection ~~from~~ Against Physical Damage. Where exposed, a grounding electrode conductor or its enclosure shall be securely fastened to the surface on which it is carried. A 4 AWG or larger copper or aluminum ~~or larger~~ grounding electrode conductor shall be protected ~~if~~ where exposed to ~~severe~~ physical damage. A 6 AWG grounding electrode conductor that is free from exposure to physical damage shall be permitted to be run along the surface of the building construction without metal covering or protection where it is securely fastened to the construction; otherwise, it shall be in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, or cable armor. Grounding electrode conductors smaller than 6 AWG shall be in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, or cable armor.

Panel Statement:

The panel added the word "electrode" to the section in three places for consistency.
The panel replaced the word "from" with the word "against" in the title in accordance with the NEC Style Manual. The panel agrees that removing the word "severe" adds clarity to this section. The panel concludes that it is difficult to distinguish between "physical damage" and "severe physical damage".

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

ROBERTSON: No substantiation was given showing that problems exist with the present wording. I suppose an argument could be made that "severe physical damage" and "physical damage" is to difficult a decision to place on the Authority Having Jurisdiction, this change will result in many requiring the grounding electrode conductor be conduit encased on every installation.
STEINMAN: The term "severe" is a necessary term to differentiate the amount of physical exposure.

5-151 Log #958 NEC-P05 **Final Action: Accept in Principle**
(250-64(B))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add "Where exposed," at the beginning of the paragraph, after "otherwise," and at the very end of the paragraph.

Substantiation:

I believe this revised wording to represent the intent of the section, but the present wording literally requires all fished or otherwise concealed GECs smaller than 4 AWG to be sleeved.

Panel Meeting Action: Accept in Principle

The panel action for this proposal has been incorporated into the panel action of Proposal 5-150.

Panel Statement:

The panel did not include the term "where exposed" in the other location(s) as proposed because it does not provide additional clarity. The proposed revision is necessary to clarify that grounding electrode conductors installed in hollow spaces, such as in walls, etc. are protected from physical damage and do not require installation in one of the methods mentioned in the last sentence. See panel action and statement to Proposal 5-150 (Log #892).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-152 Log #960 NEC-P05 **Final Action: Reject**
(250-64(B))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add ",flexible metal conduit" in both places following "electrical metallic tubing."

Substantiation:

Flex is the equivalent of cable armor, and one cannot obtain solid conductors in cable armor in my area; this is a commonly accepted usage and thus should be explicitly acknowledged.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement to Proposal 5-149 (Log #163).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: The panel action should have been accept in principle as a minimum. The panel statement is incorrect in that there was substantiation to add flexible metal conduit to this section. It is true that flexible metal conduit is not permitted where subject to physical damage, but neither is electrical metallic tubing or non-metallic rigid conduit yet these raceways are on the permitted list. There is no reason that flexible metal conduit applied in the right situations would not be just as good as EMT or RNMC where properly applied in accordance with the applicable raceway articles. See also comment on proposal 5-149.

5-153 Log #1859 NEC-P05 **Final Action: Accept in Principle**
(250-64(B))

Submitter: Andre R. Cartal, Princeton Borough Building Dept.

Recommendation:

Delete the word "severe" in the fifth line so as to read "protected if exposed to physical damage".

Substantiation:

The NEC has no definition for the word "severe" which leads to the Authorities Having Jurisdiction providing various interpretations.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement to Proposal 5-150 (Log #892).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-154 Log #2345 NEC-P05 (250-64(B)) **Final Action: Accept**

Submitter: Chris Misiuk Chesaning, MI

Recommendation:

Add a new paragraph that provides a depth of burial requirement for grounding electrode conductors to read as follows:
A bare or insulated direct burial grounding electrode conductor from the building surface to the grounding electrode or run between grounding electrodes shall be installed to a depth of not less than 300 mm (12 in.) below grade. The depth of burial shall be permitted to be reduced to 150 mm (6 in.) where the cable is beneath concrete or similar material with a thickness of not less than 50 mm (2 in.).

Substantiation:

The depth of burial requirements of Table 300.5 are not considered by most installers and inspectors to apply to grounding electrode conductors. Grounding electrode conductors installed to a shallow depth are easily damaged. There needs to be a minimum depth of burial requirement for direct burial grounding electrode conductor. A depth of 300 mm is reasonable to prevent physical damage to the grounding electrode conductor.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 12 Negative: 4

Explanation of Negative:

BRENDER: There is no definition for the term "direct burial grounding electrode conductor," and such term should not be used. Perhaps "a directly buried grounding electrode conductor" is a better phrase, as the term "grounding electrode conductor" is defined. I believe the proposed change, as worded, is incorrect English syntax and grammar.

ROBERTSON: I am opposed to this proposal with the present wording. If there were a requirement on how far from the building the grounding electrode was located before the need to bury the grounding electrode conductor, I would consider this a positive improvement in the 2005 NEC.

The way this proposal is worded will require the grounding electrode conductor to meet the 300 mm (12 in.) below grade burial depth when the service disconnect is mounted on the building or structure exterior wall and the ground rod is driven under the disconnect within inches of the wall. This is not practicable, nor would it be a good installation to bend a tight U into the grounding electrode conductor just to meet this requirement.

STEINMAN: This burial requirement is not technically substantiated by the submitter. In addition, this requirement would reduce the effectiveness of the grounding electrode system. If a grounding electrode is 12 inches from a building wall, the grounding electrode conductor would have to be buried straight down 12 inches, bend 90 degrees toward the wall for 12 inches and bent 90 degrees up to go up the building wall. Grounding electrode conductors should be as straight and short as possible. This new requirement adds (2) 90 degree bends and reduces the safety and performance of the system.

TOOMER: No substantiation that 300 mm (12 in.) below grade is any more reasonable than 150 mm (6 in.) or 450 mm (18 in.).

Comment on Affirmative:

BOKSINER: This rule should apply only to conductors where the horizontal extent of the run is greater than some distance (2 feet?).

JOHNSTON: This proposed revision is needed and addresses situations where grounding electrode conductors or bonding jumpers between grounding electrodes are subject to varying degrees of physical damage as a result of shallow burial depths when installed under the surface of the earth.

5-155 Log #2480 NEC-P05 (250-64(B)) **Final Action: Accept in Principle**

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
(B) Securing and Protection from Physical Damage. A grounding electrode conductor or its enclosure shall be securely fastened to the surface on which it is carried. A 4 AWG copper or aluminum or larger conductor shall be protected if exposed to severe physical damage. A 6 AWG grounding conductor that is free from exposure to physical damage shall be permitted to be run along the surface of the building construction without metal covering or protection where it is securely fastened to the construction; otherwise, it shall be in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, or cable armor. Grounding conductors smaller than 6 AWG shall be in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, or cable armor. Grounding electrode conductors shall not be required to comply with 300.5.

Substantiation:

During the 2002 NEC process a question was raised regarding burial requirement for grounding electrode conductors. The question was shared with some of the members of Code-Making Panel 3 and they concurred that 300.5 did not apply to these conductors. Grounding electrode conductors are frequently buried just below the surface when connected to rods. Adding this sentence provides the requirement in the NEC.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 5-154 (Log #2345).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON: See my affirmative statement to the action of the panel on proposal 5-154.

5-156 Log #2306 NEC-P05 **Final Action: Reject**
(250-64(C))

Submitter: Michael J. Johnston, International Association of Electrical Inspectors

Recommendation:

Revise Section 250.64(C) as follows:
(C) ~~Continuous.~~ Splices. The grounding electrode conductor shall be ~~installed in one continuous length without a splice or joint, unless~~ permitted to be spliced only by irreversible compression-type connectors listed for the purpose or by the exothermic welding process.
Exception: Sections of busbars shall be permitted to be connected together to form a grounding electrode conductor.

Substantiation:

The revision is editorial in nature and focuses on changing the requirement to more positive language. Similar changes were made to Section 230.46 which did not permit splices in service conductors, but by exception they were allowed if certain conditions were followed. These types of requirements should include what is acceptable by the requirement.

Panel Meeting Action: Reject

Panel Statement:

The proposed changes do not add clarity to the section.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-157 Log #2732 NEC-P05 **Final Action: Reject**
(250-64(C))

Submitter: Melvin K. Sanders, TECo., Inc.

Recommendation:

Add a new Exception and renumber accordingly.
"Exception. Transformers having primary windings, or primary and secondary windings, over 600 volt, nominal, shall be permitted to terminate the grounding electrode conductor to an identified external terminal on the transformer where provided by the manufacturer and is internally bonded to the winding(s) midpoint."

Substantiation:

At present, liquid filled medium voltage transformers are constructed such that the winding neutral is bonded to an external stud on the transformer enclosure. Based upon the present wording, there is no exception acknowledging this is a reversible splice in the grounding electrode conductor path.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not provided substantiation to indicate that midpoint (neutral) of medium voltage; oil-filled transformers are internally bonded to the transformer enclosures. Typical oil-filled transformers include factory-bonding connections that are external from the XO (midpoint) terminal to the transformer case. This might also be in conflict with the requirements of the product standards.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

MELLO: The panel should continue to reject this proposal. The panel statement is not entirely correct in addressing the proposal or the substantiation. The grounding electrode conductor is required to be connected to the accessible connection point as provided by the manufacturer, not necessary the actual common mid-point of the transformer windings. Where there is internal bonding, this information is provided on the transformer nameplate as required by ANSI C57 standards for liquid filled transformers. Where the transformer mid point is brought out to an external bushing identified by the designation Ho or Xo, that is also indicated on the nameplate and the grounding electrode conductor can be readily installed to this identified point.

5-158 Log #2957 NEC-P05 **Final Action: Accept in Principle**
(250-64(C) and 250.64 (F))

Submitter: Charles Mello, Electro-Test, Inc.

Recommendation:

Revise the text as follows:

(C) Continuous. The grounding electrode conductor shall be installed in one continuous length without a splice or joint, unless spliced only by irreversible compression-type connectors listed for the purpose or by the exothermic welding process. "In commercial and industrial installations where it is not subject to physical damage, it shall be permitted to bond a copper ground bar, with a minimum size of 1/4 inch by 2 inches with sufficient length, to a grounding electrode for the purposes of installing multiple grounding electrode conductors for the service and for separately derived systems. In this type installation, the grounding electrode conductor shall be considered the conductor from this ground bar to the service or separately derived system. Connections to the ground bar shall be by listed connectors suitable for the use or by exothermic welding."

Exception: Sections of busbars shall be permitted to be connected together to form a grounding electrode conductor.

(F) to Electrode(s). A grounding electrode conductor shall be permitted to be run to any convenient grounding electrode available in the grounding electrode system or to one or more grounding electrode (s) individually. The grounding electrode conductor shall be sized for the largest grounding electrode conductor required among all the electrodes connected to it. In commercial and industrial installations where the grounding electrodes are bonded to a common ground bar per 250.53(C), the grounding electrode conductor for the service or separately derived system shall be permitted to run to the common ground bar. Terminations on the common ground bar shall be by any listed type connector suitable for the use or by exothermic welding.

Substantiation:

These changes in concert with the change to 250.53(C) allow for the installation of a copper common grounding bar from an electrode to permit multiple connections and that where electrodes are bonded together at a common bar or where a bar is used for multiple connections from one electrode,the connections are considered as "splices" on the grounding electrode conductor. This practice has been used in large commercial buildings, telecommunications facilities and high technology manufacturing facilities for years without issues of losing the earth ground reference.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

(C) Continuous. ~~The~~ Grounding electrode conductor(s) shall be installed in one continuous length without a splice or joint except as permitted in (1) through (3):

(1) Splicing shall be permitted ~~unless spliced~~ only by irreversible compression-type connectors listed as grounding and bonding equipment ~~for the purpose~~ or by the exothermic welding process.

(2) ~~Exception:~~ Sections of busbars shall be permitted to be connected together to form a grounding electrode conductor.

(3) Bonding jumper(s) from grounding electrode(s) and grounding electrode conductor(s) shall be permitted to be connected to a copper busbar not less than 6 mm x 50 mm (1/4 in. x 2 in.) and of sufficient length for all connections. The busbar shall be securely fastened and shall be installed in an accessible location. Connections shall be made by irreversible compresssion-type connectors listed as grounding and bonding equipment or by the exothermic welding process.

Panel Statement:

The panel concludes that the concept of a minimum1/4 x 2 in. busbar for a collection point for grounding electrode conductors is already recognized for separately derived systems in 250.30(A)(3)(b). The panel excluded the proposed revisions to (F) from this proposal because the concept is already covered in 250.64(C). The panel concludes that limiting this concept to commercial and industrial installations only is not necessary where it is utilized and installed in a manner that renders it free from physical damage. The panel changed the exception to positive language and revised the section to provide a more logical layout. The panel action incorporated the proposed allowance for connections of grounding electrode conductors and bonding jumpers of the grounding electrode conductor system to a busbar. The panel affirms the proposal adds consistency between what is already permitted as an alternative for grounding electrode conductor connections where multiple separately derived systems are connected to a common grounding electrode conductor. The panel revised the text)listed for the purpose) to remove vague unenforceable terms, improve clarity, and comply with the NEC Style Manual 3.2.1.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

DOBROWSKY: The requirement for irreversible connections should be deleted. Connections can be removed at grounding electrodes and system termination points also. Irreversible connections are not required for services and the requirement should be deleted here.

STEINMAN: The use of bolted connections to this bus bar would introduce a splice not in accordance with the NEC. The grounding electrode conductor must be continuous, without splice, unless spliced with irreversible compression type connectors or by exothermic welding. The introduction of a bolted connection was added without any technical substantiation. The use of bolted connections would be extremely easy for this connection to be tampered with or forgotten, if removed for maintenance. If a bus bar is used, no mechanical type connections shall be used for attaching the grounding electrode conductors to the busbar. Connections to the busbar must be made by irreversible compression type connectors or by exothermic welding. This will maintain the permanence of the connections.

Comment on Affirmative:

JOHNSTON: This revision inserts consistency between the alternatives for connecting grounding electrode conductor taps to common grounding electrode conductors presently permitted by Section 250.30(A)(3)(b). This concept is also consistent with common engineering practices that already incorporate this concept into design. The acceptance of the proposal provides alternative rules for installers and inspectors when such designs are incorporated in field installations. Having rules that cover the specific requirements when these concepts are used will assist installers and inspectors and provide uniformity in these applications.

MELLO: The panel action text has a typographical error. The dimensions for the copper busbar should be 6 mm x 50 mm (1/4 in. x 2 in.). The 1/4 inch did not print correctly.

WHITE: I agree with the Panel's motion on this proposal to Accept in Principle. However, the last sentence in (3) relating to how connections are made to the 1/4 in. x 2 in. bus bar should be reworded as follows:

(3) Bonding jumper(s) from grounding electrode(s) and grounding electrode conductor(s) shall be permitted to be connected to a copper bus bar not less than 6 mm x 50 mm (1/4 in. x 2 in.) and of sufficient length for all connections. The bus bar shall be securely fastened and shall be installed in an accessible location. Connections to the bus bar shall be made by connectors listed for connection to copper bus bars and listed for grounding and bonding.

5-159 Log #1563 NEC-P05 (250-64(D)) **Final Action: Accept in Principle**

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.64(D) as follows:

(D) Grounding Electrode Conductor Taps. Where a service consists of more than a single enclosure as permitted in 230.40, Exception No. 2, it shall be permitted to connect taps to the common grounding electrode conductor. Each such tap conductor shall extend to the inside of each such enclosure. The common grounding electrode conductor shall be sized in accordance with 250.66 based on the sum of the cm area of the service entrance conductors, but the tap conductors shall be permitted to be sized in accordance with the grounding electrode conductors specified in 250.66 for the largest conductor serving the respective enclosures. The tap conductors shall be connected to the common grounding electrode conductor in such a manner that the common grounding electrode conductor remains without a splice.

Substantiation:

This revision is to promote consistency in the use of the tern "common grounding electrode conductor" between Section 250.30 and 250.64. The concept is the same in both sections and the terms used to describe the grounding electrode conductor to which tap conductors are permitted to be connected to should be consistent between the two sections.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement to Proposal 5-161 (Log #2652).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-161 Log #2652 NEC-P05 (250-64(D)) **Final Action: Accept in Principle**

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Revise existing Section 250.64(D) as follows:

(D) Grounding Electrode Conductor Taps. Where a service consists of more than a single enclosure as permitted in 230.71(A) ~~230.40, Exception No. 2,~~ it shall be permitted to connect taps to the common grounding electrode conductor. Each such tap conductor shall extend to the inside of each such enclosure. The common grounding electrode conductor shall be sized in accordance with 250.66, but the tap conductors shall be permitted to be sized in accordance with the grounding electrode conductors specified in 250.66 for the largest conductor serving the respective enclosures. The tap conductors shall be connected to the common grounding electrode conductor in such a manner that the common grounding electrode conductor remains without a splice.

Substantiation:

It seems the reference regarding more than one service enclosure should be to 230.71(A) rather than to 230.40 Exception No. 2 as the permission to have service disconnecting means consisting of multiple enclosures is in 230.71(A). Section 230.40 Exception No. 2 then permits a set of service-entrance conductors to be run to these multiple-enclosure services.

The word "common" is proposed to clarify the role served by the grounding electrode conductor that is "common" to each of the grounding electrode taps. This concept of naming the grounding electrode conductor that is "common" to several grounding electrode taps was included in 250.30(A)(2)(b) and 250.30(A)(3) for separately derived systems in the 1999 NEC. Clarifying this conductor will enhance understanding, reduce confusion and assist instructors in explaining the proper sizing of the common and tap grounding electrode conductors.

Panel Meeting Action: Accept in Principle

Revise existing Section 250.64(D) as follows:

(D) Grounding Electrode Conductor Taps. Where a service consists of more than a single enclosure as permitted in 230.71(A) ~~230.40, Exception No. 2,~~ it shall be permitted to connect taps to the common grounding electrode conductor. Each such tap conductor shall extend to the inside of each such enclosure. The common grounding electrode conductor shall be sized in accordance with 250.66 based on the sum of the circular mil area of the largest ungrounded service entrance conductors, but the tap conductors shall be permitted to be sized in accordance with the grounding electrode conductors specified in 250.66 for the largest conductor serving the respective enclosures. The tap conductors shall be connected to the common grounding electrode conductor in such a manner that the common grounding electrode conductor remains without a splice.

Panel Statement:

The panel has revised the recommendation to specify the method for determining the size of the common grounding electrode conductor.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-162 Log #1564 NEC-P05 (250-64(E)) **Final Action: Accept in Principle**

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.64(E) as follows:

(E) Enclosures for Grounding Electrode Conductors. Metal enclosures for grounding electrode conductors shall be electrically continuous from the point of attachment to cabinets or equipment to the grounding electrode and shall be securely fastened to the ground clamp or fitting. Metal enclosures that are not physically continuous from cabinet or equipment to the grounding electrode shall be made electrically continuous by bonding each end to the grounding electrode conductor. Bonding shall apply at each end and to all intervening raceways, boxes, and enclosures between the service equipment and the grounding electrode. The bonding jumper for a grounding electrode conductor raceway or cable armor ~~as covered in 250.64(E)~~ shall be the same size or larger than the required enclosed grounding electrode conductor. Where a raceway is used as protection for a grounding electrode conductor, the installation shall comply with the requirements of the appropriate raceway article.

Substantiation:

The revised text added to this section is not new information to the Code. These two new sentences were relocated from Section 250.92(A)(3) and Section 250.102(C). Both of these requirements exist in the current edition (2002 NEC) and relate directly to the metal enclosures for grounding electrode conductors. This revision would enhance usability by locating the requirements together rather than apart in different locations. See separate companion proposals to Section 250.92(A)(3) and 250.102(C).

Panel Meeting Action: Accept in Principle

Revise Section 250.64(E) as follows:

(E) Enclosures for Grounding Electrode Conductors. Ferrous metal enclosures for grounding electrode conductors shall be electrically continuous from the point of attachment to cabinets or equipment to the grounding electrode and shall be securely fastened to the ground clamp or fitting. Ferrous metal enclosures that are not physically continuous from cabinet or equipment to the grounding electrode shall be made electrically continuous by bonding each end of the raceway or enclosure to the grounding electrode conductor. Bonding shall apply at each end and to all intervening raceways, boxes, and enclosures between the service equipment and the grounding electrode. The bonding jumper for a grounding electrode conductor raceway or cable armor ~~as covered in 250.64(E)~~ shall be the same size or larger than the required enclosed grounding electrode conductor. Where a raceway is used as protection for a grounding electrode conductor, the installation shall comply with the requirements of the appropriate raceway article.

Panel Statement:

The panel accepts the relocated text from Sections 250.92(A)(3) and 250.102(C) (Proposals 5-184 (Log #1570) and 5-190 (Log #1536)) to be incorporated in this section and adds the words "of the raceway or enclosure" between the word "end" and the word "to" in the second sentence and added the word ferrous in two places. The panel concludes that the relocated text provides clarity and usability to this section. The word "ferrous" was added to make the requirement technically correct.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-163 Log #1566 NEC-P05 (250-64(E)) **Final Action: Accept in Principle**

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.64(E) as follows:

250.64(E)

(E) Enclosures for Grounding Electrode Conductors. Metal enclosures for grounding electrode conductors shall be electrically continuous from the point of attachment to cabinets or equipment to the grounding electrode and shall be securely fastened to the ground clamp or fitting. Metal enclosures for grounding electrode conductors ~~that are not physically continuous from cabinet or equipment to the grounding electrode~~ shall be made electrically continuous by bonding each end to the grounding electrode conductor at points of entrance and emergence from the metal enclosure. Where a raceway is used as protection for a grounding electrode conductor, the installation shall comply with the requirements of the appropriate raceway article.

Substantiation:

There has been confusion as to the intent of this requirement in 250.64(E) when protecting grounding electrode conductors from magnetic fields. The revision should clarify that metal enclosures for grounding electrode conductors should be bonded to the contained grounding electrode conductor at both ends to put the grounding electrode conductor in parallel with the raceway and minimize the stresses and choke effect at each end of the raceway or enclosure.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement to Proposal 5-162 (Log #1564).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-164 Log #1567 NEC-P05 (250-64(E)) **Final Action: Accept in Principle**

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.64(E) as follows:

250.64(E)

(E) Enclosures for Grounding Electrode Conductors. Metal enclosures for grounding electrode conductors shall be electrically continuous from the point of attachment to cabinets or equipment to the grounding electrode and shall be securely fastened to the ground clamp or fitting. Metal enclosures for grounding electrode conductors ~~that are not physically continuous from cabinet or equipment to the grounding electrode~~ shall be made electrically continuous by bonding each end to the grounding electrode conductor at points of entrance and emergence from the metal enclosure. Where a raceway is used as protection for a grounding electrode conductor, the installation shall comply with the requirements of the appropriate raceway article.

Substantiation:

There has been confusion as to the intent of this requirement in 250.64(E) when protecting grounding electrode conductors from magnetic fields. The revision should clarify that metal enclosures for grounding electrode conductors should be bonded to the contained grounding electrode conductor at both ends to put the grounding electrode conductor in parallel with the raceway and minimize the stresses and choke effect at each end of the raceway or enclosure.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement to Proposal 5-162 (Log #1564).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-165 Log #1568 NEC-P05 (250-64(E)) **Final Action: Accept in Principle**

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.64(E) as follows:

(E) Enclosures for Grounding Electrode Conductors. Metal enclosures for grounding electrode conductors shall be electrically continuous from the point of attachment to cabinets or equipment to the grounding electrode and shall be securely fastened to the ground clamp or fitting. Metal raceways or enclosures that are not physically continuous and isolated from the cabinet or equipment to the grounding electrode shall be made electrically continuous by bonding each end raceway or enclosure to the grounding electrode conductor. Where a raceway is used as protection for a grounding electrode conductor, the installation shall comply with the requirements of the appropriate raceway article.

Substantiation:

The revision should help provide clarification as to the requirement of the section. The present wording appears to leave a question as to whether or not a connection from the grounding electrode conductor to the enclosing raceway is required at points of emergence and exit. If the connection to the cabinet or enclosure on one end of the raceway is sufficient for the stresses involved, then by inserting the word "isolated" will clearly indicate when bonding at both ends is required. I feel that the Code presently indicates this as a requirement because it states "not physically continuous" which could mean connected at one end and not at the other, or it could be interpreted as meaning not connected at either end. Based on several comments from industry, it appears that a clarification is required. The panel may wish to word the section a bit different than the suggest wording, but inserting the word "isolated" might be helpful here.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement to Proposal 5-162 (Log #1564).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-166 Log #849 NEC-P05 **Final Action: Reject**
(250-64(G) (New))

Submitter: James E. Brunssen, Telcordia Technologies, Inc. / Rep. Alliance for Telecommunications Industry Solutions

Recommendation:

Add new Section 250.64 (G) as follows:
"(G) Run in Straight Line. The grounding electrode conductor shall be installed in as straight and direct a line to the grounding electrode(s) as permitted by the conditions of the installation."

Substantiation:

A grounding electrode conductor that is not run in a direct and straight a line as possible can increase the voltage developed in that conductor under lightning and other surge conditions. Sections 250.4 (A)(1) and 250.4 (B)(1) state: Electrical systems that are grounded shall be connected to earth in a manner that will limit the voltage imposed by lightning, line surges, or unintentional contact with higher-voltage lines and that will stabilize the voltage to earth during normal operation. The proposed change will provided guidance to the installer to accomplish this objective as well as a means of verification for the AHJ. Correlates with 800.40 (5), 820.40 (5), and 830.40 (5).

Panel Meeting Action: Reject

Panel Statement:

The proposed text is an unenforceable design requirement.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

BOKSINER: The proposed text is not an unenforceable design requirement but is an important safety requirement. There is already a similar requirement in 280.12 (and 285.12) as follows:
"280.12 Routing of Surge Arrester Connections. The conductor used to connect the surge arrester to line or bus and to ground shall not be any longer than necessary and shall avoid unnecessary bends."
This proposal would create a similar requirement to services that don't have a surge arrester. Presently, Article 250 does not provide any guidance to the installers on the proper routing of the Grounding Electrode Conductor (GEC). In the absence of routing requirements, there have been installations of GEC that would result in unnecessarily high impedance in the GEC under lightning or surge conditions.
SKUGGEVIG: The grounding electrode conductor is intended to conduct high-frequency bursts of current to ground from lightning-induced impulses. To be effective and keep voltage excursions on conductors in the building as low as practicable with respect to the earth (and things connected to the earth), the grounding electrode conductor needs to have low impedance. Every sharp bend in the conductor adds inductance that is insignificant at power frequencies but is not insignificant at high frequencies. Voltages dropped along the grounding electrode conductor due to current bursts from lightning strikes that are not suppressed as much as feasible have a greater likelihood of damaging insulation and contributing toward electric shock, either directly from the surge itself or indirectly from damaged insulation. I do not agree that this proposed text is unenforceable. It guides the installer and inspector to make better choices in routing the grounding electrode conductor to enhance high-frequency performance without being impractical. This proposal should be accepted.

5-167 Log #1053 NEC-P05 **Final Action: Reject**
(250-64(G))

Submitter: Wayne H. Robinson, Prince George County Government

Recommendation:

Add new text to read as follows:
250.64(G) Connections to Enclosures
Where the grounding electrode conductor is installed as permitted in 250.64(B), that portion of the conductor that enters the enclosure shall be connected using a listed method or grounding electrode conductor connector to provide adequate strain relief and to ensure a permanent and effective grounding path.

Substantiation:

In order to ensure a permanent and effective grounding path and to provide adequate strain relief, the use of listed connectors for grounding electrode conductors at its enclosure or separately derived system are necessary. In Prince George's County, Maryland, under severe fault conditions, grounding electrode conductors have become dislodged from their enclosures or damaged where the conductor enters the enclosure. Further complaints involving trip hazards causing grounding electrode conductors to become broken or damaged by the sharp edge of the enclosure where the GEC enters the enclosure or equipment. The County remedied the situation by using a listed grounding electrode connector at the enclosure or separately derived systems.

Panel Meeting Action: Reject

Panel Statement:

The panel concludes that a specific fitting listed for this specific purpose of providing strain relief is not required, but protecting the grounding electrode conductor where it enters enclosures may be required and is already covered by other general installation provisions of the NEC.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-169 Log #1615 NEC-P05 **Final Action: Reject**
(Table 250-66)

Submitter: Janet D. Skipper, Central Florida Electrical JATC / Rep. IBEW LU#606

Recommendation:

I am proposing a change to Table 250.66. I would like to see the table calculated out to the largest possible conductor grounding electrode conductor up to 500 kcmil. Then in turn delete 250.28(D), 250.30(A)(6)(a), 250.102(C). Which identify the 12 1/2 percent rule.

Substantiation:

If Table 250.66 were calculated to the highest possible grounding electrode conductor, it would clarify this section on grounding. There have been many errors caused in installation because the qualified electrician did not interrupt this section properly. As with the table on Ranges, there are no additional calculation in any other section. Table 250.66 should be the same way.

Panel Meeting Action: Reject

Panel Statement:

The proposal does not comply with Regulations Governing Committee Projects 4-3.3(c) in that the submitter has not provided any recommended text.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-170 Log #2894 NEC-P05 **Final Action: Reject**
(Table 250-66)

Submitter: John Phillips, Montgomery College

Recommendation:

Revise text to read as follows:
Size of largest ungrounded service-entrance conductor or equivalent ~~area~~ ampacity for parallel conductors.

Substantiation:

The current table (250.66) allows one, in certain instances, to install a smaller grounding electrode conductor when the ungrounded service entrance conductors are paralleled. This is the result of using the paralleled conductors' total area, instead of using the total potential load to be served.
For example:
A 400 amp service with 500 MCM Cu, ungrounded conductors would require a 1/0 Cu grounding electrode conductor.
This same 400 amp service with paralleled, 3/0 Cu, ungrounded conductors, would require a No. 2 grounding electrode conductor.
These 3/0 paralleled conductors are, according to the total area, equivalent to a single 350 MCM conductor, thereby allowing a smaller ground to be used.

Panel Meeting Action: Reject

Panel Statement:

Table 250.66 is based upon conductor size and not on ampacity. There is no technical substantiation to revise the Table column heading.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-171 Log #3076 NEC-P05 **Final Action: Accept**
(Table 250-66)

Submitter: Wally Harris, Atlantic Inland Inspections

Recommendation:

Place lines in Table as indicated to facilitate ease of use.

Insert Table 250.66 Here

(Table shown on page 2726)

Substantiation:

This proposed format will help users, by making the Table more "user friendly" to a reader's eyes.

Panel Meeting Action: Accept

Panel Statement:

Editorially add six horizontal lines to separate the requirements.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-168 Log #2895 NEC-P05 **Final Action: Reject**
(250-66 Note 1)

Submitter: John Phillips, Montgomery College

Recommendation:

Revise text to read as follows:
Where multiple sets of service-entrance conductors are used as permitted in 230.40, Exception No. 2 the equivalent size of the largest service entrance conductor shall be determined by ~~the largest sum of the areas of the corresponding conductors of each set.~~ The smallest single service-entrance conductor required for the load to be served.

Substantiation:

The current Table (250.66) allows one, in certain instances, to install a smaller grounding electrode conductor when the ungrounded service entrance conductors are paralleled. This is the result of using the paralleled conductors' total area, instead of using the total potential load to be served.
For example:
A 400 amp service with 500 MCM Cu, ungrounded conductors would require a 1/0 Cu grounding electrode conductor.
This same 400 amp service with paralleled, 3/0 Cu, ungrounded conductors, would require a No. 2 grounding electrode conductor. These 3/0 paralleled conductors are, according to the total area, equivalent to a single 350 MCM conductor, thereby allowing a smaller ground to be used.

Panel Meeting Action: Reject

Panel Statement:

Table 250.66 is based upon conductor size and not on the load served. There is no technical substantiation to revise Note 1.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-172 Log #1645 NEC-P05 **Final Action: Reject**
(Table 250-66 Exception (New))

Submitter: Michael Cohagan Colorado Springs, CO

Recommendation:

Add new text to read as follows:
Exception to Table 250.66 on single phase dwelling services fed with 2/0 copper or 4/0 aluminum the grounding electrode conductor may be permitted to be #6 copper.

Substantiation:

On service upgrades to dwelling units considerable time and expense is incurred in changing the GEC one wire size. Since Table 310.15(B)(6) permits ampacity adjustments for dwelling units, I feel adjustments should also be allowed for the GEC.

Panel Meeting Action: Reject

Panel Statement:

Table 250.66 is based upon conductor size and not on the load served or ampacity. There is no substantiation to permit a reduction in grounding electrode conductor size.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-173 Log #2481 NEC-P05 **Final Action: Reject**
(250-66(A))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
(A) Connections to Rod, Pipe, or Plate Electrodes. Where the grounding electrode conductor is connected to rod, pipe, or plate electrodes as permitted in 250.52(A)(5) or 250.52(A)(6), that portion of the conductor that is the sole connection to the grounding ~~electrode~~ electrode(s) shall not be required to be larger than 6 AWG copper wire or 4 AWG aluminum wire.

Substantiation:

Based on the information in Proposal 250-50 (2002 NEC) using a 6 AWG grounding electrode conductor is permitted for one or more of these types of electrodes. This change will clearly point out that slash rated devices are permitted on solidly grounded systems only.

Panel Meeting Action: Reject

Panel Statement:

The conductor that joins grounding electrodes together is, by definition, a bonding jumper.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

DOBROWSKY: Although the panel statement is correct, the conductor sizing requirements for mroe than one "rod" type electrode is not adequately addressed and should be included.

5-174 Log #2653 NEC-P05 **Final Action: Reject**
(250-66(B))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Delete existing Section 250.66(B) and renumber Section 250.66(C) to (B).

Substantiation:

Deleting this section will require the grounding electrode conductor to concrete encased electrodes to be sized from Table 250.66 identical to that for water pipe and building steel grounding electrodes. The reasons are:

1. It is commonly reported that these grounding electrodes make an excellent earth connection of quite low resistance. The grounding electrode conductor to these concrete encased grounding electrodes will thus carry more current while functioning to shunt overvoltages to earth than can be safely carried by the 4 AWG grounding electrode conductor.
2. The concrete encased grounding electrode of a minimum 20-foot length makes an earth connection at least equal or better than 10 ft. of underground metal water pipe. The water pipe grounding electrode requires a full size grounding electrode conductor as should be connected to the concrete encased grounding electrode.
3. There is no compelling evidence that less current would flow to a concrete encased grounding electrode than to a water pipe or building steel grounding electrode. Thus, the grounding electrode conductor to a concrete encased grounding electrode should be not less than that for the water pipe and building steel grounding electrodes.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not cited any safety concern or any hazard arising from the use of the present sizing requirements. The panel concurs that the concrete-encased electrode may be capable of carrying more current than the grounding electrode conductor but does not concur that the grounding electrode conductor needs to have the same current carrying capacity. There is no commonly reported compelling evidence that a problem exist.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER: This proposal will enhance safety and would establish parity in sizing electrode conductors. There is no evidence that less current would flow to a concrete-encased electrode, and establishing equal sizing is plain logic.

5-175 Log #2713 NEC-P05 **Final Action: Reject**
(250-68(A))

Submitter: Donny Cook, Shelby County Development Services

Recommendation:

Revise text to read as follows:

250.68 Grounding Electrode Conductor and Bonding Jumper Connection to Grounding Electrodes.

The connection of a grounding electrode conductor or bonding jumper to a grounding electrode shall be made in a manner that will ensure a permanent and effective grounding path. Where necessary to ensure the grounding path for a metal piping system used as a grounding electrode, effective bonding shall be provided around insulated joints and around any equipment likely to be disconnected for repairs or replacement. Bonding conductors shall be of sufficient length to permit removal of such equipment while retaining the integrity of the bond.

Substantiation:

90.1 indicates the purpose of this Code is the practical safeguarding of persons and property from hazards arising from the use of electricity. If the ground connection not being accessible was a threat to persons and property, I am certain that CMP-5 would not allow the current exception to 250.68(A). I also believe if the connection to a concrete encased or buried connection to an electrode is safe, a connection to the first 5 feet of water pipe inside of a building, or the connection to building steel inside of a building that was not accessible is just as safe. The current requirement for accessibility requires the Authority Having Jurisdiction to require an access hole to be provided in living room walls, in the wall of the company president's office or some other place that the building owner does not desire to have an access hole, if that is where the grounding electrode connection is made. It is very difficult to justify providing access to a connection that does not need to be disconnected. If the connection is disconnected a very real safety issue is created. When Authorities Having Jurisdiction enforce this requirement, they realize that as soon as the inspection is completed, many owners will have the access covered. Contractors and electricians are caught in the middle of satisfying the requirements of the Code and satisfying the desires of their customers. Deleting the requirement would not prohibit providing access, if the owner wanted access and would allow inspectors, contractors and electricians to be concerned with issues that provide practical safeguarding of persons and property rather than arguing with owners about holes in their walls.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not provided technical substantiation to delete the requirement for accessibility of grounding electrode conductor and bonding jumper connections to grounding electrodes. The panel intends that accessibility be required for those conductor connections to electrodes that are not inherently protected from damage.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-176 Log #1021 NEC-P05 **Final Action: Accept in Principle**
(250-68(A) Exception)

TCC Action:

The Technical Correlating Committee directs that the Action on this Proposal be rewritten to comply with the NEC Style Manual to read as follows:
"Exception No. 1: An encased or buried connection to a concrete-encased, driven, or buried grounding electrode shall not be required to be accessible.
Exception No. 2: An exothermic or irreversible compression connection to fire-proofed structural metal shall not be required to be accessible".

Submitter: Lawrence A. Bey, Cummins Power Generation

Recommendation:

Revise the Exception to read as follows:
"Exception: An encased or buried connection to a concrete-encased, driven , or buried grounding electrode, or an exothermic or irreversible compression connection to fire-proofed building steel shall not be required to be accessible."

Substantiation:

Although the structural steel in steel-frame buildings is required to be used as an electrode, and multiple connections may be required where there are many separately-derived systems, the NEC does not currently recognize the fact that much of this steel is sprayed with fire-proofing that renders the connections inaccessible. Where the connection is removable, such as where mechanical pressure connectors (lugs) are used, the connection probably should be made elsewhere or such connections should not be used. However, if the connection is a permanent connection of a type that could otherwise be buried or encased and connected to ground rings, concrete-encased electrodes, or the like, then such connections should also be permitted where connected to building steel, and if the steel is required by other standards to be coated or encased in fire-proofing materials these connections will not be accessible. As it stands, the only way to make these connections accessible is to move them to less substantial steel members that are not fire-proofed. Installers and designers should not be prohibited from making the best possible connection to the most substantial steel members in such cases.

Panel Meeting Action: Accept in Principle

Revise the Exception to read as follows:
Exception: An encased or buried connection to a concrete-encased, driven, or buried grounding electrode shall not be required to be accessible. An exothermic or irreversible compression connection to fire-proofed structural metal shall not be required to be accessible.

Panel Statement:

The added text meets the intent of the submitter.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-177 Log #3297 NEC-P05 **Final Action: Reject**
(250-70(1))

Submitter: Justin Frederick, Staff Electric

Recommendation:

A clarification of the term "pipe plug" or removal.

Substantiation:

The term "pipe plug" does not seem to be a used term in the field, and would like a definition of the term to be more clear.

Panel Meeting Action: Reject

Panel Statement:

The term "pipe plug" is a commonly used industry term and providing a definition is not necessary. The submitter did not provide specific proposed text. The submitter did not provide any technical substantiation to remove the term "pipe plug".

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-178 Log #1210 NEC-P05 **Final Action: Reject**
(250-80)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text to read as follows:
250.80 Service Raceways and Enclosures. Metal enclosures and raceways for service conductors and equipment shall be mechanically and electrically continuous. Where they are not electrically continuous they shall be bonded together. ~~grounded.~~
Exception: A metal elbow that is installed in an underground installation of rigid nonmetallic conduit and is isolated from possible contact by a minimum cover of 450 mm (18 in.) to any part of the elbow shall not be required to be bonded ~~grounded~~.

Substantiation:

The term "grounded" is used incorrectly in this application. Bonding and grounding is the correct term.

Panel Meeting Action: Reject

Panel Statement:

The submitter did not provide any substantiation for including the concept of being mechanically and electrically continuous. This substantiation does not match the proposed text.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-179 Log #927 NEC-P05 **Final Action: Reject**
(250-80 Exception)

Submitter: John M. Vargo, Vargo Electric

Recommendation:

Delete the exception to 250.80 as follows:
~~Exception: A metal elbow that is installed in an underground installation of rigid nonmetallic conduit and is isolated from possible contact by a minimum cover of 450 mm (18 in.) to any part of the elbow shall not be required to be grounded.~~

Substantiation:

A ground fault that would occur in this elbow would not trip a service overcurrent device because it is not grounded. Being under 450 mm (18 in.) of cover is meaningless.

Panel Meeting Action: Reject

Panel Statement:

The existing practice is commonly used without evidence of a problem. There is no practical method of providing a bonding connection to the elbow. The 18 in. cover provides an adequate level of isolation from possible contact if a fault occurs in the elbow.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-180 Log #1080 NEC-P05 **Final Action: Reject**
(250-81)

Submitter: Otakar Libansky Lighthouse Point, FL

Recommendation:

In order to remove the electromagnetic field (EMF) in residential buildings, the electrical grounding system must only be connected to a grounding electrode.

Substantiation:

The practice of electrical grounding in residential homes to a water pipe generates an EMF. The majority of scientific studies of EMFs have found exposure to EMFs to be harmful to the human organism. In homes where the grounding system is attached to a water pipe, the induced EMF is very high, in some instances over 50 mG, and people are usually unaware of their exposure to such levels and of the potential risk to their health. As part of my research I have conducted EMF studies involving more than 100 homes in Broward County, Florida, since 1994 and found that none of the homes where the grounding was to a water pipe reached the recommended EMF safety level of 2 mG. When the grounding system was disconnected from the water pipe and connected only to a grounding electrode, the induced EMF was eliminated.
The connection to a grounding electrode is sufficient, inasmuch as the use of PVC pipes is prevalent today.
Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

The proposal does not include proposed revised text to a rule or exception in the NEC. The proposal is not submitted in a format consistent with the requirements of 4-3.3 of the NFPA Regulations Governing Committee Projects and does not follow the NEC Style Manual.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-181 Log #812 NEC-P05 **Final Action: Accept**
(250-84)

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text to read as follows:
Underground Service Cable Or Raceway ~~Conduit~~.
(A) Underground Service Cable. The sheath or armor of a continuous underground metal-sheathed or armored service cable system that is ~~metallically connected~~ bonded to the grounded underground system shall not be required to be grounded at the building or structure. The sheath or armor shall be permitted to be insulated from the interior metal raceway conduit or piping.
(B) Underground Service Raceway ~~Conduit~~ Containing Cable. An underground metal service raceway ~~conduit~~ that contains a metal-sheathed or armored cable bonded to the grounded underground system shall not be required to be grounded at the building or structure. The sheath or armor shall be permitted to be insulated from the interior metal raceway ~~conduit~~ or piping.

Substantiation:

Edit. EMT is not prohibited by Code or listing from underground installation and where used should be covered by this section.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER: The word "raceway" includes EMT, while the present word "conduit" does not.
There is no substantiation presented why EMT should be included as an underground service conduit. EMT is lighter metal than conduit, and usually set-screw-connected, and corrodes more readily than IMC or rigid. No safety study has been submitted to justify this change.
Further, Table 300-4 does not permit direct burial of EMT. Also see "General Information for Electrical Equipment," The UL White Book.

5-182 Log #1211 NEC-P05 **Final Action: Reject**
(250-86)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text to read as follows:
250.86 Other Conductor Enclosures and Raceways. Except as permitted by 250.112(I), metal enclosures and raceways for other than service conductors shall be bonded ~~grounded.~~
Exception No. 1: Metal enclosures and raceways for conductors added to existing installations of open wire, knob and tube wiring, and nonmetallic-sheathed cable shall not be required to be bonded ~~grounded~~ where these enclosures or wiring methods
(a) Do not provide an continuous equipment ground path;
(b) Are in runs of less than 7.5 m (25 ft);
(c) Are free from probable contact with ground, grounded metal, metal lath, or other conductive material; and
(d) Are guarded against contact by persons.
Exception No. 2: Short sections of metal enclosures or raceways used to provide support or protection of cable assemblies from physical damage shall not be required to be bonded ~~grounded.~~
Exception No. 3: A metal elbow shall not be required to be bonded ~~grounded~~ where it is installed in a nonmetallic raceway and is isolated from possible contact by a minimum cover of 450 mm (18 in.) to any part of the elbow or is encased in not less than 50 mm (2 in.) of concrete.

Substantiation:

The term "grounded" is used incorrectly in this application. Bonding and grounding is the correct term.

Panel Meeting Action: Reject

Panel Statement:

The submitter's substantiation does not match the proposed text. The submitter did not provide any substantiation for adding the terms "continuous" and "path" to 250.86 Exception No. 1(a).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-183 Log #1108 NEC-P05 **Final Action: Reject**
(250-86 Exception No. 2)

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Revise wording of Exception No. 2:
"Sections of metal enclosures or raceways 10 ft or shorter in length used to provide protection...".
(remainder to stay the same).

Substantiation:

The present wording is not clear enough. What may be "short" to one electrician may be too long to another. This will set parameters.

Panel Meeting Action: Reject

Panel Statement:

The submitter did not provide any substantiation for using 10 ft as a maximum dimension. Depending on the specific conditions, 10 ft may be either too short or too great.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-184 Log #1570 NEC-P05 **Final Action: Reject**
(250-92(A)(3))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.92(A)(3) as follows:

Relocate existing last sentence of Section 250.92(A)(3) to Section 250.64(E).

250.92 Services.

(A) Bonding of Services. The non–current-carrying metal parts of equipment indicated in 250.92(A)(1), (2), and (3) shall be effectively bonded together.

(1) The service raceways, cable trays, cablebus framework, auxiliary gutters, or service cable armor or sheath except as permitted in 250.84.

(2) All service enclosures containing service conductors, including meter fittings, boxes, or the like, interposed in the service raceway or armor.

(3) Any metallic raceway or armor enclosing a grounding electrode conductor as specified in 250.64(B). ~~Bonding shall apply at each end and to all intervening raceways, boxes, and enclosures between the service equipment and the grounding electrode.~~

Substantiation:

The last sentence of Section 250.92(A)(3) deals more with how to accomplish the bonding required by this section. The performance language and requirements for bonding each end of the raceway to the grounding electrode conductor is provided in detail in Section 250.64(E). This section, 250.92(A) includes a list of items to be bonded at the service. The last sentence deals with accomplishing the bonding and locations and is more appropriate to appear in 250.64(E).

Panel Meeting Action: Reject

Panel Statement:

The requirement still applies to services and is helpful to the user by remaining here.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: The panel action should be to accept this proposal. The proposal was accepted in 250.64 for the added text that was relocated from this section. The panel statement is not technically correct. The requirement for the bonding of metallic enclosures that contain the grounding electrode conductor applies to wherever the grounding electrode conductor is used, not just services. This section really is to identify what needs to be bonded and not how that bonding is to be completed. The present 250.92(A)(3) directs the user to the correct location in 250.64(B), which contains other requirements beyond just the text proposed to be deleted here and properly relocated to 250.64(E).

5-185 Log #998 NEC-P05 **Final Action: Accept in Principle**
(250-92(B)(4))

Submitter: Noel Williams, Noel Williams Consulting

Recommendation:

Revise item (4) in the list to read:
(4) "Other listed devices, such as bonding-type locknuts or bushings or grounding bushings with bonding jumpers."

Substantiation:

This proposal is intended to clarify two points:
(1) All such devices are required to be listed according to 250.8 and this change will clarify that it is not only a matter of Authority Having Jurisdiction judgment. Although this is already covered by 250.8, a change in a single word will make it much clearer here to the code user or enforcer.
(2) There is a difference in the listing and naming of bonding bushings and grounding bushings, and while some bushings are both, the most common types are grounding bushings which are required to be used with a jumper. This language will also help to clarify the existing language that follows this item so the user will be more likely to understand that bonding bushings are not suitable where there are concentric or eccentric knockouts because a bonding jumper is required to connect the bushing to the intact metal of the enclosure.

Panel Meeting Action: Accept in Principle

Revise (4) to read as follows:
(4) Other listed devices such as bonding-type locknuts, ~~and~~ bushings, or bushings with bonding jumpers.

Panel Statement:

This section applies to bonding and the term bonding is more appropriate.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-186 Log #1571 NEC-P05 **Final Action: Accept in Part**
(250-94)

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 16 for information.

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise 250.94 as follows:
250.94 Bonding for Other Systems.
An accessible means external to enclosures for connecting intersystem bonding and grounding electrode conductors shall be provided at the service equipment and at the disconnecting means for any additional buildings or structures by at least one of the following means:
(1) Exposed nonflexible metallic raceways
(2) Exposed grounding electrode conductor
(3) Approved means for the external connection of a copper or other corrosion-resistant bonding or grounding electrode conductor to the grounded raceway or equipment
FPN No. 1: A 6 AWG copper conductor with one end bonded to the grounded nonflexible metallic raceway or equipment and with 150 mm (6 in.) or more of the other end made accessible on the outside wall is an example of the approved means covered in 250.94(3).
FPN No. 2: See 800.40, 810.21, and 820.40 for bonding and grounding requirements for communications circuits, radio and television equipment, and CATV circuits.

Substantiation:

This revision provides clarification and also consistency with the Articles in Chapter 8. There are similar proposals to include the word "electrode" in Article 800, 810, 820, and 830 where referring to a conductor that has the purpose of establishing a connection to the grounding electrode. This revision would be consistent with a similar change made in the 2002 NEC in Section 250.32 and promotes a common language of communication between terms used in the Code that function in similar fashion.

Panel Meeting Action: Accept in Part

Accept only the addition of the word "electrode" in the first sentence.

Panel Statement:

CMP-5 requests that the Technical Correlating Committee send this Proposal to CMP-16 for information.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO: The panel action should be accept. The added term "electrode" is correct in both locations and not just the first sentence. The term grounding conductor is defined in Article 100 but is much more generic and the language in this section needs to be very clear. This is one more case of terminology that needs to be cleaned up so the panel says what is meant.

Comment on Affirmative:

JOHNSTON: This proposal provides consistency in the use of the term "grounding electrode conductor" in place of "grounding conductor" in this section. Panel 5 changed the term in 250.32 in the 2002 cycle to help clarify the intent of the rule. It is vitally important for all the Code Making Panels to use grounding and bonding terms as they are defined for proper application of the Code by field installers and accurate and consistent enforcement by electrical inspectors. Similar proposals were submitted to change the same term in Chapter 8 where it is currently being improperly used.

5-187 Log #3165 NEC-P05 **Final Action: Reject**
(250-94)

Submitter: Eric Stromberg, The Dow Chemical Company

Recommendation:

Addition of another paragraph to this section:
All systems that derive power from a particular service must have their equipment grounding conductors bonded to the Grounding Electrode for the same service from which they derive power. This includes CATV, Communications systems, Computer systems, Sensitive Electronic equipment, and all other systems.

Substantiation:

Currently, there are some manufacturers of electronic equipment that explicitly state that their equipment must be connected to an isolated ground rod or else the warranty for the equipment will not be honored. We know that, if this equipment is installed in a jurisdiction that has adopted the code, they cannot enforce this requirement and would lose a lawsuit if one were brought covering this. However, there still exists much confusion surrounding this issue and 250.5r is erroneously cited as allowing for this. A clear statement to the effect that all systems must be bonded together will put this issue to rest.

Panel Meeting Action: Reject

Panel Statement:

Accepting this proposal would prohibit using more than one electrode in the electrode system without any technical substantiation.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

MELLO: The panel action was correct but the statement is incomplete. The statement should be supplemented with an explanation that 250.58 already provides that all of the services, separately derived systems etc. in any one building or structure are required to use the same grounding electrode systems. 250.50 is very clear that any grounding electrodes installed in the earth for a building or structure are required to be bonded together to form the grounding electrode system. Since there is only one grounding electrode system, the connection of all equipment that receives power in any building or structure would have to reference back to the one grounding electrode system. The condition stated in the substantiation about manufacturer's instructions is clearly a Code violation.

5-188 Log #3430 NEC-P05 **Final Action: Reject**
(250-96(B))

Submitter: Robert Schuerger, EYP Mission Critical Facilities, Inc.

Recommendation:

Revise as follows:
250.96(B) ~~Isolated~~ Insulated Grounding Circuits. Where required for the reduction of electrical noise (electromagnetic interference) on the grounding circuit, an equipment enclosure supplied by a branch circuit shall be permitted to be isolated from a raceway containing circuits supplying only that equipment by one or more listed nonmetallic raceway fittings located at the point of attachment of the raceway to the equipment enclosure. The metal raceway shall comply with provisions of this article and shall be supplemented by an internal ~~insulated~~ dedicated equipment grounding conductor installed in accordance with 250.146(D) to ground the equipment enclosure.
FPN: Use of ~~an isolated~~ dedicated equipment grounding conductor does not relieve the requirement for grounding the raceway system.

Substantiation:

The use of the term "isolated" has caused confusion which has led to improper and unsafe installations in which a separate grounding electrode and grounding system is installed isolated from the rest of the building's grounding system. Since the separate grounding system is not properly bonded to the building's grounding system, a significant voltage can be developed between the two grounding systems in the case of lightning or an electrical fault. This creates a significant hazard for both personal injury and fire. There have been many cases of this type of installation in the past, particularly with machine tools, data processing equipment and other sensitive and electronic equipment installations.
Changing "isolated" to "insulated" also brings this section in alignment with the existing 517.16 Receptacles with Insulated Grounding Terminals.
This text is also being proposed for the revision of IEEE Std. 1100, Powering and Grounding Electronic Equipment.

Panel Meeting Action: Reject

Panel Statement:

The Panel does not agree with the submitter's terminology. Insulated applies to the terminal and the conductor not the receptacle design. Dedicated implies only one device can be on the isolated grounding circuit which is not the intent of this section. Panel concludes the revised text does not add clarity.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

DOBROWSKY: The submitter's concept will add clarity and should be accepted in concept but the title should also be modified.

5-188a Log #CP503 NEC-P05 **Final Action: Accept**
(250-97 Exception)

Submitter: Code-Making Panel 5

Recommendation:

Change the words listed for the purpose to "... listed to provide a permanent, reliable electrical bond, ...". In addition, change the exception in section "(d) Listed fittings for bonding that are identified for the purpose" to "(d) Listed fittings."

Substantiation:

The panel revised the text to remove vague unenforceable terms, improve clarity, and comply with the NEC Style Manual 3.2.1.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-189 Log #2482 NEC-P05 **Final Action: Accept**
(250-100)

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:

250.100 Bonding in Hazardous (Classified) Locations. Regardless of the voltage of the electrical system, the electrical continuity of non-current-carrying metal parts of equipment, raceways, and other enclosures in any hazardous (classified) location as defined in Article 500 shall be ensured by any of the methods specified ~~for services~~ in 250.92(B)(2) through (4) that are approved for the wiring method used. One or more of these bonding methods shall be used whether or not supplementary equipment bonding conductors are installed.

Substantiation:

Some individuals are interpreting this requirement as being met if an equipment bonding conductor (equipment grounding conductor) is installed with the circuit conductors. During a fault condition, current will be present on the raceways and arcing can occur at connection points even with additional internal bonding conductors. The term services was removed to avoid confusion and item (1) was deleted because connecting to the grounded conductor is not appropriate either.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON: This additional wording provides clarity from a functionality perspective. The section addresses bonding. The equipment grounding (protective bonding) conductor installed inside the raceway is not intended to be used as an alternative or substitute for the requirement for bonding the metallic raceways and enclosures together in the manner specified by this section.

SKUGGEVIG: See my Comment on Affirmative on Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".

5-190 Log #1536 NEC-P05 **Final Action: Reject**
(250-102(C))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.102(C) as follows:
Remove the last sentence of the section and relocate it to Section 250.64(E).
(C) Size — Equipment Bonding Jumper on Supply Side of Service. The bonding jumper shall not be smaller than the sizes shown in Table 250.66 for grounding electrode conductors. Where the service-entrance phase conductors are larger than 1100 kcmil copper or 1750 kcmil aluminum, the bonding jumper shall have an area not less than 12 1/2 percent of the area of the largest phase conductor except that, where the phase conductors and the bonding jumper are of different materials (copper or aluminum), the minimum size of the bonding jumper shall be based on the assumed use of phase conductors of the same material as the bonding jumper and with an ampacity equivalent to that of the installed phase conductors. Where the service-entrance conductors are paralleled in two or more raceways or cables, the equipment bonding jumper, where routed with the raceways or cables, shall be run in parallel. The size of the bonding jumper for each raceway or cable shall be based on the size of the service-entrance conductors in each raceway or cable.
~~The bonding jumper for a grounding electrode conductor raceway or cable armor as covered in 250.64(E) shall be the same size or larger than the required enclosed grounding electrode conductor.~~

Substantiation:

This proposal is a companion proposal to revise Section 250.64(E) by relocating language directly related to the concept and sizing requirements for installations where metallic enclosures are installed for grounding electrode conductors. The relocated text from 250.102(C) is directly related to sizing of bonding jumpers used from an enclosed grounding electrode conductor to the metallic raceway or enclosure as covered in 250.64(E). The relocated text should improve usability in the Code. This revision has no impact on current requirements of these sections, as it is just relocated text.

Panel Meeting Action: Reject

Panel Statement:

The requirement still applies to equipment bonding jumpers and is helpful to the user by remaining here. See panel action and statement on Proposal 5-184 (Log #1570).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

DOBROWSKY: The proposal should be accepted. Repeating requirements in the NEC does not improve usability.
MELLO: The panel action should be to accept this proposal. The proposal was accepted in 250.64 for the added text that was relocated from this section. The panel statement is not technically correct. The size of the equipment bonding jumper for this section is for the fault current carrying capacity on the supply side of the service. The requirement for the bonding of metallic enclosures that contain the grounding electrode conductor applies to wherever the grounding electrode conductor is used, not just services. When analyzed carefully the last sentence is a tag on and does not really belong in this section at all. The sizing of the bonding jumper for the raceway containing the grounding electrode conductor has nothing to do with fault current, as this section deals with it, but everything to do with keeping the metal raceways and enclosures in as close to a parallel path as possible to preclude counter EMF or the "choke effect". See panel action on proposal 5-162.

5-191 Log #2483 NEC-P05 **Final Action: Reject**
(250-102(E))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
(E) Installation. The equipment bonding jumper shall be permitted to be installed inside or outside of a raceway or enclosure. Where installed on the outside, the length of the equipment bonding jumper shall not exceed 1.8 m (6 ft) and shall be routed with (not spiraled around) the raceway or enclosure. Where installed inside of a raceway, the equipment bonding jumper shall comply with the requirements of 250.119 and 250.148.
Exception: An equipment bonding jumper longer than 1.8 m (6 ft) shall be permitted at outside pole locations for the purpose of bonding or grounding isolated sections of metal raceways or elbows installed in exposed risers of metal conduit or other metal raceway.

Substantiation:

Wrapping the conductor in a spiral fashion increases the impedance and should be specifically prohibited.

Panel Meeting Action: Reject

Panel Statement:

Spiraling a conductor does not add significant impedance if limited to 6 ft.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

DOBROWSKY: The proposal should be accepted. Spiraling the conductor significantly increases its impedance.

5-192 Log #3161 NEC-P05 **Final Action: Reject**
(250-104(A)(3))

Submitter: Eric Stromberg, The Dow Chemical Company

Recommendation:

Change reference from 250.66 to 250.122.

Substantiation:

Feeders or Branch circuits are protected by OCP. This being the case, the size of the grounding conductor should be based on 250.122. If it is the intent of the Code Panel to size this as per 250.66 as a special case, it should be noted in a Fine Print Note to this effect.

Panel Meeting Action: Reject

Panel Statement:

The proposed text is based on feeder and branch circuit conductors. Table 250.122 is based on overcurrent protective device sizes.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-193 Log #245 NEC-P05 **Final Action: Accept**
(250-104(A)(4))

Submitter: Brenda Austin Lansing, MI

Recommendation:

Add the following to the end of the paragraph after the reference to Table 250.66: based on the largest ungrounded conductor of the separately derived system. The last sentence of this paragraph will then read:
Each bonding jumper shall be sized in accordance with Table 250.66 based on the largest ungrounded conductor of the separately derived system.

Substantiation:

The rule needs to be specific. Table 250.66 needs an ungrounded conductor size in order to determine the bonding conductor size. Not all separately derived systems have ungrounded conductors of the same size.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-194 Log #1537 NEC-P05 **Final Action: Reject**
(250-104(A)(4))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.104(A)(4) as follows:

(4) Separately Derived Systems. The grounded conductor of each separately derived system shall be bonded to the nearest available point of the interior metal water piping system(s) in the area served by each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with Table 250.66.

Exception: A separate water piping bonding jumper shall not be required where the effectively grounded metal frame of a building or structure is used as the grounding electrode for a separately derived system and is bonded to the metallic water piping in the area served by the separately derived system.

Substantiation:

This revision would provide consistency between the other parts of this section that address water piping installed in or attached to a building or structure. The language in Section 250.104(A)(4) presently refers only to interior metal water piping. This bonding requirement should be applicable to interior as well as exterior installations.

Panel Meeting Action: Reject

Panel Statement:

No proposed change in text was provided.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-195 Log #1538 NEC-P05 **Final Action: Reject**
(250-104(A)(4))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.104(A)(4) as follows:

(4) Separately Derived Systems. The grounded conductor of each separately derived system shall be bonded to the nearest available point of the ~~interior~~ metal water piping system(s) in the area served by each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with Table 250.66.

Exception: A separate water piping bonding jumper shall not be required where the effectively grounded metal frame of a building or structure is used as the grounding electrode for a separately derived system and is bonded to the metallic water piping in the area served by the separately derived system.

Substantiation:

This revision would provide consistency between the other parts of this section that address water piping installed in or attached to a building or structure. The language in Section 250.104(A)(4) presently refers only to interior metal water piping. This bonding requirement should be applicable to interior as well as exterior installations.

Panel Meeting Action: Reject

Panel Statement:

Accepting this proposal would require an interior separately derived system to be bonded to exterior piping if the exterior piping is closer.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

JOHNSTON: This proposal should be accepted to provide consistency with the action of Panel 5 that addressed the word "interior" in the 2002 cycle relative to the water piping system bonding requirements. If the word "interior is left in this section, the bonding requirement is literally only applicable to interior installations. There are many installations on the exterior of buildings where the water piping system bonding provisions of this section should apply to provide an effective bonding path direct to the source. The panel makes a point but has not addressed situations where separately derived systems installed inside the building supply equipment both inside and outside of the building or structures. There are also separately derived systems installed outside buildings or structures that supply equipment outside the building or structure and water piping is in the same area served by the derived system. For example, a mechanical equipment yard with motor control centers, chillers, cooling towers, water pumps, etc. where separately derived systems supply circuits in the vicinity of exterior water piping. This is a safety issue and deserves reconsideration by the panel.

5-196 Log #1539 NEC-P05 **Final Action: Accept**
(250-104(A)(4))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Delete Section 250.104(A)(4) and relocate the text to a new Section 250.104(D).

~~(4) Separately Derived Systems. The grounded conductor of each separately derived system shall be bonded to the nearest available point of the interior metal water piping system(s) in the area served by each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with Table 250.66.~~

~~Exception: A separate water piping bonding jumper shall not be required where the effectively grounded metal frame of a building or structure is used as the grounding electrode for a separately derived system and is bonded to the metallic water piping in the area served by the separately derived system.~~

Substantiation:

This revision is needed to accommodate the structural steel bonding provisions within the requirements for separately derived systems. Section 250.104(A) includes water piping system bonding requirements only in its present form. To include the structural steel bonding provisions located in 250.30(A)(3)(d) in the 2002 edition, the new section under water and steel bonding is needed. See companion proposal that includes additional structural steel bonding provisions previously found in 250.30.

Panel Meeting Action: Accept

To be clear, delete Section 250.104(A)(4) and relocate the text to a new Section 250.104(D).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON: This action is consistent with the larger accepted efforts of the task group to reorganize Section 250.30 to provide a more logical order and layout. The bonding provisions associated with separately derived systems is applicable to structural metal members and water piping systems. The panel should reconsider the action taken on proposal 5-201 as that proposal intended to relocate the structural metal and water bonding requirements to this relocated section.

5-197 Log #2484 NEC-P05 **Final Action: Accept**
(250-104(B))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
(B) Other Metal Piping. Where installed in or attached to a building or structure, metal piping system(s), including gas piping, that is likely to ~~may~~ become energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or to the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with 250.122 using the rating of the circuit that is likely to ~~may~~ energize the piping system(s). The equipment grounding conductor for the circuit that is likely to ~~may~~ energize the piping shall be permitted to serve as the bonding means. The points of attachment of the bonding jumper(s) shall be accessible.
FPN: Bonding all piping and metal air ducts within the premises will provide additional safety.

Substantiation:

The term "may" should "only be used where it recognizes discretionary judgment on the part of an authority having jurisdiction" according to 3.1.2 of the NEC Style Manual. The phrase "likely to become energized" is provided in Annex B of the NEC Style Manual as meaning "failure of insulation on".

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER: This is a major change in the intent and application of the Code without justification. The intent of present Code language is that all metal water piping should be bonded, for purposes of safety.
This proposal would eliminate that requirement. There is no way an inspector or other person could anticipate future changes to the electric system. Present wording was established to help ensure present and future safety of personnel.
Section 3.2.1 of the Style Manual includes "likely" as possibly being unenforceable and vague. "May" is a much more encompassing term than "is likely."

5-198 Log #3207 NEC-P05 **Final Action: Reject**
(250-104(B), FPN 2 (New))

Submitter: David Zinck, NewburyPort Wiring Inspector

Recommendation:

Make the existing FPN No. 1.
Add FPN No. 2 to read as follows:
FPN No. 2: When intentionally bonding the metal gas piping system, this connection must be made on the interior of any isolating bushing installed on the gas piping.

Substantiation:

Many areas use cathodic protection for corrosion protection of their underground metal gas piping system. Such a system has an isolating bushing to purposely isolate the incoming gas piping from the interior gas piping. It is important that if the gas piping is intentionally bonded, that this bond be installed on the interior side of this isolating bushing. Not doing so compromises the cathodic protection.

Panel Meeting Action: Reject

Panel Statement:

Fine Print Notes can not contain requirements. The proposed requirement is already covered by the existing text. Using the term "interior" is confusing.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-199 Log #1109 NEC-P05 **Final Action: Accept in Principle**
(250-104(C))

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Revise text to read as follows:
(C) Structural ~~Seel~~ Metal. Exposed structural ~~steel~~ metal that is interconnected to form a ~~steel~~ metal building frame... (remainder to stay the same).

Substantiation:

I have wired many building additions constructed of aluminum posts and beams bolted to aluminum roof and wall panels. This entire room is metal and may become energized but is not required to be bonded because it is aluminum and not steel. Only a Fine Print Note in 250.116 gives us guidance.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 5-200 (Log #2485).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-200 Log #2485 NEC-P05 **Final Action: Accept in Principle**
(250-104(C))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
(C) Structural Steel. Exposed structural steel that is interconnected to form a steel building frame and is not intentionally grounded and is likely to ~~may~~ become energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with Table 250.66 and installed in accordance with 250.64(A), (B), and (E). The points of attachment of the bonding jumper(s) shall be accessible.

Substantiation:

The term "may" should "only be used where it recognizes discretionary judgment on the part of an authority having jurisdiction" according to 3.1.2 of the NEC Style Manual. The phrase "likely to become energized" is provided in Annex B of the NEC Style Manual as meaning "failure of insulation on".

Panel Meeting Action: Accept in Principle

Revise 250.104(C) to read as follows:
(C) Structural ~~Steel~~ Metal. Exposed structural ~~steel~~ metal that is interconnected to form a ~~steel~~ metal building frame and is not intentionally grounded and is likely to ~~may~~ become energized ... "

Panel Statement:

The panel concludes this meets the intent of the submitter. This also includes changes proposed from Proposal 5-199 (Log #1109).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER: See my Explanation of Negative on Proposal 5-197. Similarly here, the submitter is weakening the present intent and language of the Code, compromising safety. The term "may" is not the equivalent of "is likely to". This is a much more substantial change to the Code language than would appear on the surface.

5-201 Log #1540 NEC-P05 **Final Action: Reject**
(250-104(D) (New))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Create a new Section 250.104(D) with the relocated text from 250.104(A)(4) and revise as follows:

(D) Separately Derived Systems. Metal water piping systems and structural steel that is interconnected to form a building frame shall be bonded to separately derived systems in accordance with the following:

(1) Metal Water Piping System(s) The grounded conductor of each separately derived system shall be bonded to the nearest available point of the ~~interior~~ metal water piping system(s) in the area served by each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with Table 250.66.

Exception: A separate water piping bonding jumper shall not be required where the effectively grounded metal frame of a building or structure is used as the grounding electrode for a separately derived system and is bonded to the metallic water piping in the area served by the separately derived system.

(2) Structural Steel. Where exposed structural steel that is interconnected to form the building frame ~~or interior metal piping~~ exists in the area served by the separately derived system, it shall be bonded to the grounded conductor of each separately derived system. ~~grounding electrode conductor in accordance with 250.104.~~ This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with Table 250.66. Where a common grounding electrode conductor is installed for multiple separately derived systems as permitted by Section 250.30(A)(3), exposed structural steel that is interconnected to form the building frame or interior metal piping exists in the area served by the separately derived system, it shall be bonded to the common grounding electrode conductor. ~~in accordance with 250.104.~~

Substantiation:

This proposed new section relocates the structural steel and metal water piping system bonding requirements out of 250.30 and into Section 250.104 which includes bonding rules. The 2002 NEC included a section for separately derived system bonding under 250.104(A), but that requirement was only for water piping. Section 250.30(A)(3)(d) includes both steel and water bonding requirements, which should be located under bonding in Part V of Article 250. Part II of Article 250 is titled "Circuit and System Grounding". The relocation of the bonding provisions to new Section 250.104(D) provides clarity for the user. The revisions in the relocated text are editorial in nature.

Panel Meeting Action: Reject

Panel Statement:

Accepting this proposal would create confusion where the structural metal frame of a building was used as the grounding electrode. See also the panel statement on Proposal 5-195 (Log #1538).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 13 Negative: 3

Explanation of Negative:

BRENDER: This proposal enhances safety and eliminates the effect of ground loops being formed, among other things. Elimination of the word "interior" ensures that all metal water piping is bonded, as well as structural steel. Use of the grounded conductor for this purpose could form ground loops, and may be inadequate in size.

JOHNSTON: The panel should reconsider the action on this proposal. This proposal was part of the work of the task group to reorganize and revise Section 250.30. The structural metal member bonding requirements previously located in 250.30((A)(3)(d) were intended to be located to this section as a result of the work of the task group. If this proposal is rejected the structural steel bonding requirement for bonding that currently exists for separately derived systems will be removed from the Code.

MELLO: The panel accepted the concept to move the bonding requirements for both metallic water and for structural metal for separately derived systems to 250.104(D) to cover when the metallic water and/or the structural metal was not used as the grounding electrode. This was done in proposal 5-78. This proposal was the completing action to take the applicable part from 250.104(A) and from 250.104(C) that existed for all systems and properly place them together as they apply for separately derived systems. The proposed change resolved exactly the problem the panel statement says is created. Where the metallic water or the structural metal is used as the electrode, then no additional bonding is required to the "electrode" but the other item is required to be bonded. This proposal should have been accepted in principle as a minimum with edited text if the proposed text was unclear. The combined panel actions have users directed to a section that now only deals with metallic water systems.

5-202 Log #240 NEC-P05 **Final Action: Accept in Principle**
(250-112)

Submitter: Barbara Litwiller, Michigan State University

Recommendation:

Add these words to the end of the main paragraph of 250.112 as follows:
250.12 Fastened in place or Connected by Permanent Wiring Methods (Fixed) - Specific. Exposed, non-current carrying metal parts of the kinds of equipment described in 250.112(A) through (K), and non-current carrying metal parts of equipment and enclosures described in 250.112(L) and (M), shall be grounded regardless of voltage to the equipment grounding conductor at the service equipment by a means described in 250.118.

Substantiation:

The sentence requires the fastened in place equipment to be grounded. The definition of grounded in Article 100 states "connected to earth or to some conducting body that services in place of the earth."
This is not what grounded means in 250.112. The intent is equipment grounding which is not defined in Article 100, only equipment grounding conductor is defined. Make it clear to what the fixed in place equipment is to be grounded, and how it is to be grounded.

Panel Meeting Action: Accept in Principle

Revise 250.112 as follows:
250.112 Fastened in Place or Connected by Permanent Wiring Methods (Fixed) - Specific.Exposed, non-current-carrying metal parts of the kinds of equipment described in 250.112(A) through (K), and non-current-carrying metal parts of equipment and enclosures described in 250.112(L) and (M), shall be ~~grounded~~ bonded to the point of grounding for service equipment or point of grounding of a separately derived system regardless of voltage.

Panel Statement:

The panel modified the proposed text to include separately derived systems and more clearly state the requirement for providing a fault current path.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: The present wording is clear. It requires grounding by means of an equipment grounding conductor. The proposed wording, when taken literally, will require each item listed in 250.112 to have a separate grounding conductor run directly from the item to the service equipment or point of grounding of a separately derived system.

5-203 Log #821 NEC-P05 **Final Action: Reject**
(250-112(F)(i))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text to read as follows:
Garages, Theaters, and Motion Picture Studios: Electric equipment in garages, theaters, and motion picture studios ~~except pendant lampholders supplied by circuits not over 150 volts to ground.~~
(I) Power-Limited, Remote-Control, Signaling, and Fire Alarm Circuits: Equipment powered by Class 1, Class 2, and Class 3 remote-control and signaling circuits, and by fire alarm circuits, ~~shall be grounded where system grounding is required by Part II or Part VIII of this article.~~

Substantiation:

Metal parts of pendant lampholders on circuits over 150 volts to ground are not exempt from grounding, which infers there may be a shock hazard, which can exist for lampholders on circuits not over 150 volts to ground. This subsection only requires grounding where system grounding is required; where a system is grounded by choice it does not apply, even though a potential hazard is not altered based on whether grounding is required or by choice. Equipment supplied by a Class 1 480-volt ungrounded system is not required to be grounded; metal equipment supplied by a 480-volt general power circuit is required to be grounded.

Panel Meeting Action: Reject

Panel Statement:

The submitter did not provide accurate existing text. The submitter did not provide any evidence of a safety hazard to delete the existing exemption. The deletion of the word "commercial" would apply this requirement to all types of garages without substantiation.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-204 Log #1592 NEC-P05 **Final Action: Reject**
(250-114)

Submitter: Frank Martucci Fort Lee, NJ

Recommendation:

After existing text, "exposed noncurrent-carrying metal parts of cord and plug-connected equipment likely to become energized shall be..." add: REDUNDANTLY grounded.

(a) Two grounding conductors shall be installed in cord and cord sets with the branch circuit conductors supplying the unfixed equipment.

(b) Component Grounding poles. Cord connectors and attachment plugs shall be provided with two separate wiring sites at the existing grounding pole. Cord female connectors, and male attachment plugs shall be designed so that only the grounding pole can be wired with two conductors.

Substantiation:

[Text of Proposal 5-204 substantiation is shown on page 2306]

Panel Meeting Action: Reject

Panel Statement:

The panel has again reviewed the submitter's substantiation and reaffirms its previous statements on this subject. The panel concludes that the substantiation fails to provide convincing evidence that the mentioned fires and associated casualties were the result of incorrect wiring of extension cords or that the proposed methods of redundant grounding would have prevented these occurrences from taking place. This proposal would completely eliminate the present method of grounding cord-and-plug connected equipment and would mandate the implementation of an equipment grounding system utilizing two grounding conductors. If adopted this proposal would necessitate the manufacture of special hardware including new 4-conductor cords with redundant grounding conductors, and new plugs and connectors that can terminate these 4- conductor cords. The panel recognizes that redundancy can enhance the reliability of some systems under some conditions. However, redundancy is not the only effective means of achieving enhanced protection against electric shock. Other effective methods which are now required or permitted, such as ground-fault protection, double insulation, and assured equipment grounding conductor connections have all attributed to a decline in accidental electrocutions in recent years despite the increased use of electrical devices.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

HAMMEL: I agree with the panel action. I do not agree with all of the panel statement. There is no evidence that the assured equipment grounding conductor program has attributed to a decline in accidental electrocutions.

5-205 Log #140 NEC-P05 **Final Action: Reject**
(250-116(4))

Submitter: Louis J. Gale, Tansations Electric

Recommendation:

Add new and delete text to read as follows:

(4) Accessible electrical conducting material, such as siding, rain gutters, and/or downspouts, that is likely to be energized (capacitively or magnetically) by nearby power sources over 600 volts.

~~FPN: Where extensive metal in or on buildings...shock...come in contact with the siding.~~

FPN: Human touch or a voltmeter can usually detect capacitively or magnetically energized material. Bonding of extensive conductive material that can be directly energized by voltages under 600 volts will provide additional safety.

Substantiation:

I investigated a case of mild shock at a residence near a power line, but off the right of way. Prior to Christmas 2000, the resident was hanging Christmas lights around his soffits and was shocked when he touched the rain gutters. He could have fallen from the ladder. Later, his children playing in the yard touched the downspout and felt a shock.

Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

Using the term "nearby" is vague and not enforceable. It is impractical to require all conductive objects to be grounded.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-206 Log #999 NEC-P05 (250-118) **Final Action: Reject**

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 8 for information.

Submitter: Noel Williams, Noel Williams Consulting

Recommendation:

Revise (6)(d) and (7)(e) to read: "The conduit is not installed for flexibility while the connected equipment is in use."

Substantiation:

This is a companion to proposals to 348.60 and 350.60. Flexible conduits are nearly always installed for flexibility in installation. This fact often results in misinterpretations that require separate equipment grounding conductors in virtually all flexible conduits. Flexibility during installation should not be the concern of this section. The concern is that the conduit may be required to be flexible so that the equipment may move or be moved while in use and that such use may damage or otherwise impair the continuity of the grounding path. In such cases, a redundant equipment grounding conductor should be installed.

The panel has already rejected proposals to previous editions of the NEC to require separate equipment grounding conductors where equipment is subject to vibration, as everything is subject to some vibration, however minimal. Impairment of the grounding path is most likely when some strain is imposed on the connectors, which in turn is most likely when equipment must be allowed to move for some reason.

Panel Meeting Action: Reject

Panel Statement:

The present wording provides criteria for acceptability and also provides some flexibility based on job site conditions for the Authority Having Jurisdiction to determine suitability. The proposed text does not resolve all the conditions and could allow a hazardous condition to be created when conduit is flexed and the equipment is not "in use". CMP 5 requests that the Technical Correlating Committee forward this proposal to CMP 8 for comment.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

DOBROWSKY: The submitter's concerns should be addressed. Presently the requirement does not specify whether the flexibility is to be determined in use or during the installation process.

5-207 Log #2878 NEC-P05 **Final Action: Reject**
(250-118 (New))

Submitter: Joseph A. Hertel, Safety and Buildings / Rep. Dept. of Commerce, State of Wisconsin

Recommendation:

Add text to read as follows:

The equipment grounding conductor run with or enclosing circuit conductors shall be one or more or a combination of the following and where the equipment grounding conductor is a metallic raceway installed in direct contact with earth, in concrete slabs or floors poured on earth, or in exterior concrete walls below grade it shall be augmented with a supplemental equipment grounding conductor identified in 250.118(1). This supplemental conductor shall be sized in accordance with 250.122. An aluminum equipment grounding conductor used for this purpose shall be insulated.

Substantiation:

There are many instances where metal raceways installed below grade are corroding excessively and are no longer capable of providing the equipment grounding function intended. Including an equipment grounding conductor identified in 250.118(1) with metal raceways assures that an equipment ground will be available in the event of a fault. Article 514 allows nonmetallic raceways underground and requires metallic raceways where they emerge. It is difficult at a later date to determine if metallic or nonmetallic raceways were installed. continuity readings will generally be Zero because of additional piping, product piping and other raceways that may be installed. The required installation of a conductor in all underground raceways will eliminate this guesswork.

Panel Meeting Action: Reject

Panel Statement:

Section 250.118 is for identification of the items suitable to be equipment grounding conductors. The submitter's text is for installation therefore this proposal is submitted for the incorrect section. The submitter is invited to submit a comment to clearly identify the section the text should be considered for so the panel can see the intent.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: The Submitter has provided the correct location for the proposal. When the raceways identified as (2) through (8) are installed in direct contact with the earth or in concrete, they may not be suitable to be used as an equipment grounding conductor due to the potential for corrosion. The addition of a supplementary equipment grounding conductor, of the type identified as (1), will insure that an equipment ground is maintained in spite of corrosion.

Comment on Affirmative:

BRETT: I support the panel action but disagree with the panel statement. The submitter has not provided technical substantiation for this change.

The submitter's substantiation cites an exception in Article 514 where an equipment grounding conductor is required by the present code language. The installer has the responsibility to make each installation in accordance with the NEC.

RMC, IMC and EMT are listed galvanized steel raceways and provide corrosion protection from normal soil conditions. Where corrosion is known to be an issue, supplemental corrosion protection is required and can be provided in several ways. PVC coated conduit is readily available and provides excellent physical and corrosion protection. High corrosive conditions cannot be corrected with a supplemental equipment grounding conductor.

SKUGGEVIG: Aside from the issues of putting the proposal in the right place in the Code as advised in the Panel Statement, the Submitter needs to address technical issues. The same harsh conditions that jeopardize the electrical continuity of the metal raceway will also act to cause failure of the equipment grounding conductor (wire) after the raceway has failed leaving sections of the wires exposed. A supplementary equipment grounding conductor might be unable to sufficiently improve the overall reliability of the dual grounding path, and does not address the problem of keeping all of the conductors fully protected inside of an intact raceway. The problem of dealing with a harsh environment cannot be solved by simply adding another vulnerable and marginally protected component into the harsh environment. The metal raceway must be made more resistant to failure in the harsh environment if it is to be used in this environment. If the raceway can be made to better withstand the harsh environment, then there is nothing wrong with the metal raceway's ability to serve as the sole grounding path, without a supplementary grounding conductor.

5-208 Log #2993 NEC-P05 **Final Action: Reject**
(250-118)

Submitter: Monte Ewing, State of Wisconsin

Recommendation:

Put all that is in 250.118 now under 250.118(A) and create 250.118(B) Where a metallic raceway is installed in direct contact with earth, in concrete slabs or floors poured on earth, or in exterior concrete walls below grade it shall be augmented with a supplemental equipment grounding conductor identified in 250.118(A)(1). The supplemental equipment grounding conductor shall be sized in accordance with 250.122. An aluminum equipment grounding conductor installed for this purpose shall be insulated.

Substantiation:

This requirement has been in the Canadian Electrical Code for many years now. The problem is out of sight out of mind in a sense. We know that metal in contact with ground moisture corrodes with time. This occurs regularly without any form of maintenance until a circuit fails. One hazard is a ground fault and no return path due to a corroded raceway that cannot be seen. By requiring the supplemental conductor we can assure a ground fault path regardless of raceway fatigue. It can easily save a life,a fire, or possibly an explosion in classified areas. 547.9(C) protects livestock from this hazard but the same hazard exists for humans.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 5-207 (Log #2878).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: See my Explanation of Negative on Proposal 5-207.

Comment on Affirmative:

BRETT: I support the panel action but disagree with the panel statement. The submitter has not provided technical substantiation for this change.

All raceways are required to be listed. RMC, IMC and EMT are listed galvanized steel raceways and provide corrosion protection from normal soil conditions. Where corrosion is known to be an issue, supplemental corrosion protection is required and can be provided in several ways. PVC coated conduit is readily available and provides excellent physical and corrosion protection. High corrosive conditions cannot be corrected with a supplemental equipment grounding conductor.

SKUGGEVIG: Aside from the issues of putting the proposal in the right place in the Code as advised in the Panel Statement, the Submitter needs to address technical issues. The same harsh conditions that jeopardize the electrical continuity of the metal raceway will also act to cause failure of the equipment grounding conductor (wire) after the raceway has failed leaving sections of the wires exposed. A supplementary equipment grounding conductor might be unable to sufficiently improve the overall reliability of the dual grounding path, and does not address the problem of keeping all of the conductors fully protected inside of an intact raceway. The problem of dealing with a harsh environment cannot be solved by simply adding another vulnerable and marginally protected component into the harsh environment. The metal raceway must be made more resistant to failure in the harsh environment if it is to be used in this environment. If the raceway can be made to better withstand the harsh environment, then there is nothing wrong with the metal raceway's ability to serve as the sole grounding path, without a supplementary grounding conductor.

5-209 Log #501 NEC-P05 **Final Action: Reject**
(250-118(11))

Submitter: James M. Daly, General Cable

Recommendation:

Revise 250.118(11) as follows:
a. The ~~combined metallic sheath and~~ grounding conductor of interlocked metal tape-type MC cable.
b. The metallic sheath or the combined metallic sheath and grounding conductors of the smooth or corrugated continuous tube type MC cable.

Substantiation:

The interlocked tape armor is not recognized as an equipment grounding conductor. It is not a metallic sheath. It has a small cross sectional area and since it is applied helically, it has a length much longer than the cable. Both of these conditions result in a high resistance to ground. The internal equipment grounding conductor must comply with 250.122. The interlocking armor must also be grounded, but it cannot be considered as part of the equipment grounding conductor.
The metallic sheaths referred to in b. are actually hollow conductors and can be used as equipment grounding conductors either alone or in parallel with internal equipment grounding conductor provided the metallic sheath alone or the combination of the sheath and internal grounding conductor complies with 250.122.
This revision will make it clear to the user that the interlocking tape armor is not adequate for an equipment grounding conductor.

Panel Meeting Action: Reject

Panel Statement:

The NEC is the parent document and determines that where MC cable with metallic sheath and grounding conductor is listed and is identified for grounding, it is then recognized. The provisions in the main part of 250.118(11) is where the listing and identification requirements are located. The panel understands that one manufacturer has submitted a product for listing laboratory evaluation to achieve this listing and is close to completion. The term "continuous" is not used in the section text to correlate the Code terminology with the listing laboratory guide card information.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

HAMMEL: Many electricians have misinterpreted this section. Consider the installation of an isolated receptacle, as permitted in 250-146(D), installed in a metal box. MC cable of the interlocked metal tape-type, that contained only one grounding conductor, would not provide the required equipment grounding conductor and the permitted isolated equipment-grounding conductor. MC cable of the interlocked metal tape-type, that contains multiple equipment grounding conductors, is manufactured for this purpose.

5-210 Log #192 NEC-P05 **Final Action: Accept**
(250-118(14))

TCC Action:

The Technical Correlating Committee directs that the panel clarify the panel action on this proposal and clearly indicate if the requirement for listing applies to all of the items listed or if it only applies to auxilliary gutters. This action will be considered by the panel as a public comment. The Technical Correlating Committee directs that this proposal be referred to Code-Making Panels 8 and 9 for comment.

Submitter: Jason Nequist, Nequist Electric

Recommendation:

Before the word "raceways" add the word "enclosures" with a comma after "enclosures" and after "raceways" so the sentence will read as follows:
(14) Other electrically continuous metal enclosures, raceways, and auxiliary gutters listed for grounding.

Substantiation:

This section does not recognize metal enclosures as an equipment grounding means and metal enclosures needs to be added to the list.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-211 Log #2293 NEC-P05 **Final Action: Accept in Principle**
(250-118(14) Exception (New))

TCC Action:

See the Technical Correlating Committee Note on Proposal 5-1. The Technical Correlating Committee notes that the issue of determining acceptability for the particular wiring method for grounding is the responsibility of the applicable Code-Making Panel. For this proposal, Code-Making Panel 8 has the responsibility to determine if the wiring method is acceptable as proposed. The Technical Correlating Committee refers this proposal to Code-Making Panel 8 for comment.

Submitter: Norman Smith, I.B.E.W. Local 291 / Rep. Labor

Recommendation:

Insert after Section 250.118(14).
Exception: Where metallic conduit is installed on roof tops, an equipment grounding conductor shall be provided within the raceway and sized per Section 250.122.

Substantiation:

Metallic conduit on rooftops is exposed to extreme temperature changes and weather conditions and may lose electrical continuity at connections and the capacity to conduct safely any fault current likely to be imposed on them.

Panel Meeting Action: Accept in Principle

Revise the text to add an exception to 250.118 located after 250.118(14) to read as follows:
Exception: Where metallic conduit is installed on rooftops, an equipment bonding conductor of the types specified in 250.118(1) shall be provided within the raceway and sized per Section 250.122.

Panel Statement:

This issue has been raised with varying amounts of technical substantiation for several Code cycles. The problem being identified really relates to an unsuitable use and installation of this wiring method leading to these conditions. The panel understands the safety concerns raised by the submitter's substantiation. CMP 5 requests the Technical Correlating Committee to refer this proposal to CMP 8 for action.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 12 Negative: 4

Explanation of Negative:

BRETT: The submitter has not provided technical substantiation for this proposed change. His statement is true that weather conditions exist on rooftops. However, the present language in the code already covers these installations. Proper installations in accordance with present code language take all these conditions into consideration.

The panel actions taken have not been substantiated. All proposals over the past several code cycles have cited workmanship issues relating to small sizes (1/2 and 3/4) of metallic and nonmetallic unthreaded raceways being improperly installed.

The code has always required raceways to be properly supported and secured. 300.7(B) states: "Raceways shall be provided with expansion fittings where necessary to compensate for thermal expansion and contraction." All raceways are required to be listed. RMC, IMC and EMT are listed galvanized steel raceways and provide corrosion protection. Physical protection is also adequately addressed in each code article.

The change as accepted would require all metal raceways to have an equipment grounding conductor installed including threaded raceways up to trade size 6. What substantiation has been provided to require threaded metal raceways to have a supplemental equipment grounding conductor? These requirements would also apply regardless of the purpose i.e., Service, Feeder, Branch circuit, etc.

The change is overly restrictive and the responsibility should remain with the designer. Please reject this proposal.

DOBROWSKY: The submitter's substantiation indicates that the wiring method chosen for this specific installation was not suitable. Even if an equipment bonding conductor was installed if the wiring method was damaged, the conductors would be exposed creating a hazard. Many existing wiring methods have been safely used for many years without an additional equipment bonding conductor.

SKUGGEVIG: The same harsh conditions that jeopardize the electrical continuity of the metal raceway will also act to cause failure of the equipment grounding conductor (wire) after the raceway has failed leaving sections of the wires exposed. A supplementary equipment grounding conductor might be unable to sufficiently improve the overall reliability of the dual grounding path, and does not address the problem of keeping all of the conductors fully protected inside of an intact raceway. The problem of dealing with a harsh environment cannot be solved by simply adding another vulnerable and marginally protected component into the harsh environment. The metal raceway must be made more resistant to failure in the harsh environment if it is to be used in this environment. If this is accomplished, then there is nothing wrong with the metal raceway's ability to serve as the sole grounding path, without a supplementary grounding conductor. In addition, see my Comment on Affirmative on Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".

STEINMAN: There is no technical substantiation provided to make this change. The substantiation provided by the submitter is a violation of 300.7(B), "raceways shall be provided with expansion fittings where necessary to compensate for thermal expansion and contraction." Properly installed, metallic raceway systems are good equipment grounding paths.

Comment on Affirmative:

RAPPAPORT: The word "conduit" should be replaced with the generic term "raceway" in order to include electrical metallic tubing.

TOOMER: The panel recognized there is a problem, therefore since it has the authority, it should require an equipment bonding conductor be installed for safety.

5-212 Log #1495 NEC-P05 **Final Action: Reject**
(250-118(4))

Submitter: Ken Goerdt, Encompass Electrical Technologies-Rocky Mountains

Recommendation:

Add new text to read as follows:
Electrical metallic tubing only in concealed locations or ceilings not subject to physical damage.

Substantiation:

The problem I see is EMT separated at the couplings in areas that don't appear to be subject to severe physical damage. The conductors aren't damaged but there is no EGC beyond that point.

Panel Meeting Action: Reject

Panel Statement:

The substantiation identifies a problem on the correct installation of Electrical Metallic Tubing as the wiring method in accordance with Article 358 of the present Code. 250.118(4) of the present Code is only to identify EMT as a suitable equipment grounding conductor. The proposal did not provide substantiation that EMT is unsuitable when properly installed.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER: The Panel should have voted "Accept in Principle" and reworded the submission. Concealed locations and ceilings are locations not normally inspected after installation. This proposal points out a possible safety hazard where physical damage may interrupt the electrical continuity of the EMT, hazards not inherent in IMC or rigid.

I believe what the submitter should have proposed is "Electrical metallic tubing, except in concealed locations and ceilings." There have been reported instances where both routine vibration and non-routine vibration have loosened set screw couplings, resulting in interruption to the grounding path.

5-213 Log #139 NEC-P05 **Final Action: Accept in Principle in Part**
(250-118(5))

Submitter: Steven Touloumis, Village of Oak Park, IL

Recommendation:

Revise text to read as follows and on 250.118 list number (5) only:
~~(5) Flexible metal conduit where both the conduit and fittings are listed for grounding.~~
(5) Flexible metal conduit that is listed for grounding, meeting all the following conditions:
a. The conduit is terminated in fittings listed for grounding.
b. The combined length of flexible metal conduit and flexible metallic tubing and liquidtight flexible metal conduit in the same ground return path does not exceed 1.8 m (6 ft).
c. The conduit is not installed for flexibility.
(The rest of the list items shall remain unchanged).

Substantiation:

The current wording of list number (5) of Section 250.118 is misleading as to the grounding requirements for flexible metal conduit listed for grounding.

The first sentence of Section 348.60 specifically says, "Where used to connect equipment where flexibility is required, an equipment grounding conductor shall be installed."

List item number (6) of Section 250.118 lists four requirements that must be met in order for "listed flexible metal conduit not listed for grounding" to be acceptable as an equipment grounding conductor.

Underwriters Labatories does not recognize any flexible metal conduit as being acceptable for grounding in lengths exceeding 6 ft.

By not having any requirements for list number (5) of 250.188, but having four requirements for list number (6), implies that the requirements of number (6) are not required for number (5), which is not true due to ULs listing and Section 348.60.

The proposed wording eliminates an incorrect logic being used in determining the proper use of flexible metal conduit listed for grounding as an equipment grounding conductor.

Panel Meeting Action: Accept in Principle in Part

The panel accepts the deletion of (5) in principle and does not accept the additional text of the new (5).

Panel Statement:

The proposed revision of (5) was not accepted because it was deleted. See panel action on Proposal 5-215 (Log #2767).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-214 Log #1541 NEC-P05 **Final Action: Accept in Principle**
(250-118(5))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise Section 250.118(5) as follows:
250.118 Types of Equipment Grounding Conductors.
The equipment grounding conductor run with or enclosing the circuit conductors shall be one or more or a combination of the following:
(1) A copper, aluminum, or copper-clad aluminum conductor. This conductor shall be solid or stranded; insulated, covered, or bare; and in the form of a wire or a busbar of any shape.
(2) Rigid metal conduit.
(3) Intermediate metal conduit.
(4) Electrical metallic tubing.
(5) Flexible metal conduit ~~where both the conduit and fittings are listed for grounding and~~ that is installed in accordance with the requirements of 250.118(6).

Substantiation:

Flexible metal conduit does not appear to be listed currently for grounding by recognized qualified electrical testing laboratories in accordance the provisions in 90.7. The standard for flexible metal conduit does not include this use or testing for use as an equipment grounding conductor, at least that I am aware of. Flexible metal conduit as an equipment grounding conductor must meet the limitations of 250.118(6) when used as an equipment grounding conductor as a result of the high impedance introduced into the effective ground fault current path. The information in the product guide card and general information directory indicates that flexible metal conduit is not listed for grounding.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 5-215 (Log #2767).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-215 Log #2767 NEC-P05 **Final Action: Accept**
(250-118(5))

TCC Action:

It was the action of the Technical Correlating Committee that this proposal be forwarded to Code-Making Panel 8 for comment.

Submitter: Douglas Hansen, Codecheck

Recommendation:

Delete 250.118(5)

Substantiation:

Underwriters Laboratories General Information Directory for Electrical Equipment contains the following statement: "Flexible metal conduit longer than 6 ft. has not been judged to be suitable as a grounding means." Situations up to six feet in length are covered in 250.118(6).

Panel Meeting Action: Accept

Editorially renumber sections following this deletion.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON: I concur with the panel action on this proposal. This action removes any doubt about flexible metal conduit being acceptable as an equipment grounding conductor in lengths longer than 6 feet. This is a safety issue as is directly related to the equipment grounding (protective bonding) conductor of the circuit. The revision will clarify that listed flexible metal conduit is listed but is not currently listed or evaluated as an effective ground-fault current path for grounding in lengths longer than 6 feet. This should assist installers and inspectors and reduce improper application of flexible metal conduit as an equipment grounding conductor in the field.

5-216 Log #2768 NEC-P05 **Final Action: Accept in Principle**
(250-118(6))

TCC Action:

See the Technical Correlating Committee Note on Proposal 5-1.

Submitter: Douglas Hansen, Codecheck

Recommendation:

Add test as follows:
Provide a definition of flexibility in Article 250 by adding a sentence to the end of 250.118(6)d as follows:
(6) Listed flexible metal conduit that is not listed for grounding, meeting all the following conditions:
a. The conduit is terminated in fittings listed for grounding.
b. The circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less.
c. The combined length of flexible metal conduit and flexible metallic tubing and liquidtight flexible metal conduit in the same ground return path does not exceed 1.8 m (6 ft).
d. The conduit is not installed for flexibility. As used in this article, flexibility refers to vibrating equipment such as transformers and motors, and to equipment that may be pivoted in place after installation, such as a floodlight or spotlight.

Substantiation:

The term “flexibility” is also mentioned in article 320, 348, 350, and 356 all with reference to a need for an equipment grounding conductor. To assure uniform application of the term, this definition provides specific examples of situations where an equipment grounding conductor would be required. The definition belongs in article 250, and will not contradict the use of the term in the cable or conduit articles. The word “flexibility” means different things in different parts of the code, and also appears in articles 400, 501, 502, 503, 505, 553, 555, and 610. A general definition in Chapter 1 would not cover all of these applications.

Panel Meeting Action: Accept in Principle

Revise 250.118(6) as follows:
(6) Listed flexible metal conduit ~~that is not listed for grounding,~~ meeting all the following conditions:
a. The conduit is terminated in fittings listed for grounding.
b. The circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less.
c. The combined length of flexible metal conduit and flexible metallic tubing and liquidtight flexible metal conduit in the same ground return path does not exceed 1.8 m (6 ft).
d. Where used to connect equipment where flexibility is required, an equipment bonding conductor shall be installed.

Panel Statement:

Requirements from Article 348 have been incorporated into these revisions. The definition of "flexibility" properly belongs in Article 100. This proposal also correlates with the action of Proposal 5-1 (Log #2453e).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: My vote would be affirmative except that the term "equipment bonding conductor" is not acceptable. See my Explanation of Negative on Proposal 5-1.

Comment on Affirmative:

DOBROWSKY: The term "required" should be replaced with "necessary". The concept of flexibility "in use" verus "during installation" needs to be addressed.
SKUGGEVIG: See my Comment on Affirmative on Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".

5-217 Log #3189 NEC-P05 **Final Action: Accept in Principle**
(250-118(6)(d))

Submitter: Truman C. Surbrook, Michigan State University

Recommendation:

Revise condition d. as indicated:
d. The conduit is not intended to be flexed during normal use of the equipment supplied. ~~installed for flexibility.~~

Substantiation:

The term flexibility is not defined. There is a conflict with 348.30(A) Exception 2 where it states that a length of 3 feet is not permitted to be installed supported only by the connectors where flexibility is required. Apparently, the two references to flexibility have different meanings. As used in this section, why is flexible metal conduit even needed if not for flexibility? I think the intent is more in line with the revised wording. If I am not correct, please help by rewording the statement.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 5-216 (Log #2768).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-218 Log #3185 NEC-P05 **Final Action: Accept in Principle**
(250-118(7)(e))

TCC Action:

See the Technical Correlating Committee note on Proposal 5-1.

Submitter: Truman C. Surbrook, Michigan State University

Recommendation:

Revise condition d. as indicated:
e. The conduit is not intended to be flexed during normal use of the equipment supplied. ~~installed for flexibility.~~

Substantiation:

The term flexibility is not defined. There is a conflict with 350.30(A) Exception 2 where it states that a length of 3 feet is not permitted to be installed supported only by the connectors where the flexibility is required. Apparently, the two references to flexibility have different meanings. As used in this section, why is liquidtight flexible metal conduit even needed if not for flexibility? I think the intent is more in line with the revised wording. If I am not correct, please help by rewording the statement.

Panel Meeting Action: Accept in Principle

Revise 7(e) to read as follows:
(e) Where used to connect equipment where flexibility is required, an equipment bonding conductor shall be installed.

Panel Statement:

The revised text correlates with 350.60. This proposal also correlates with the action of Proposal 5-1 (Log #2453e).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: My vote would be affirmative except that the term "equipment bonding conductor" is not acceptable. See my Explanation of Negative on Proposal 5-1.

Comment on Affirmative:

SKUGGEVIG: See my Comment on Affirmative on Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".

5-219 Log #807 NEC-P05 **Final Action: Accept in Part**
(250-119)

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text to read as follows:
Unless otherwise required or permitted elsewhere in this Code, equipment grounding conductors shall be permitted to be bare, covered, or insulated. Individually covered or insulated equipment grounding conductors shall have a continuous outer finish that is either green or green with one or more continuous yellow stripes, except as otherwise permitted in this section.
(A) Conductors Larger Than No. 6 AWG. An insulated or covered conductor larger than 6 AWG ~~copper or aluminum~~ shall be permitted, at the time of installation, to be permanently identified as an equipment grounding conductor at each ~~end and at every point where the conductor is accessible~~ connection and junction point.
Exception: Conductors larger than 6 AWG shall not be required to be marked in conduit bodies that contain no splices or unused hubs.

Substantiation:

Stripes should be specified to be continuous, as in 200.6(A)(B)(C) and (E). Specifying conductor material is superfluous; copper-clad aluminum is not noted. Conductors may loop through a grounding connection, which is then not the "end" of the conductor. Where the conductor is terminated without a connection, whether in a box, other enclosure, or as open wiring, can be considered a junction point.
The word "accessible" may apply to conductors in a raceway which are capable of being withdrawn, open aerial conductors, and single conductors in cable trays, and thus literally require the entire length to be identified. In contrast, field marking is not required for grounded conductors and high-leg conductors at every point where they are accessible.
While identification at junction points is important, it doesn't seem warranted for conduit bodies where conductors are pulled through without splice, and there are no unused hubs for future connections.

Panel Meeting Action: Accept in Part

Accept the deletion of the following text: "copper or aluminum" and the added text to create the exception. Reject all the remaining proposed changes.

Panel Statement:

The panel determined the added terminology does not add clarity. The term "continuous" is already included in the product safety standard so it is redundant to add it in the NEC. The panel concluded the existing terminology is proper. It is the panel's intent that equipment grounding conductors are to be identified at every location they are accessible.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-220 Log #2679 NEC-P05 (250-119) **Final Action: Accept in Principle**

TCC Action:

See the Technical Correlating Committee note on Proposal 5-1.

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Revise existing Section 250.119 as follows:

250.119 Identification of Equipment Grounding Conductors.

Unless required elsewhere in this Code, equipment grounding conductors shall be permitted to be bare, covered, or insulated. Individually covered or insulated equipment grounding conductors shall have a continuous outer finish that is either green or green with one or more yellow stripes except as permitted in this section. Conductors with insulation that is green, green with one or more yellow stripes, or identified as permitted by this section shall be used only as an equipment grounding conductor.

Substantiation:

The Code has long required that insulated conductors used as an equipment be identified green or green with one or more yellow stripes. However, Article 250 has not gone the next step to limit the use of conductors so identified as equipment grounding conductors.

It is reported by electrical inspectors that some are using conductors with green insulation as ungrounded (hot) conductors by phase taping the insulation. It is also reported that the phase tape has come off the conductor insulation. When this happens, a conductor with green insulation has a potential above ground and represents a shock or flash hazard to electricians.

Conductor insulations of other than green color are readily available so there should not be a reason to phase tape green insulation and use it as an ungrounded or grounded conductor.

Panel Meeting Action: Accept in Principle

Change the term "equipment grounding conductor" to "equipment bonding conductor."

Panel Statement:

This proposal has been correlated with action of Proposal 5-1 (Log #2453e).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: My vote would be affirmative except that the term "equipment bonding conductor" is not acceptable. See my Explanation of Negative on Proposal 5-1.

Comment on Affirmative:

SKUGGEVIG: See my Comment on Affirmative on Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".

5-222 Log #1454 NEC-P05 (250-119(A)) **Final Action: Reject**

Submitter: G. Scott Jones, Encompass Electrical Technologys

Recommendation:

Delete the whole section 250.119(A) as follows:

~~(A) Conductors Larger than 6 AWG. An insulated or covered conductor larger than 6 AWG copper or aluminum shall be permitted, at the time of installation, to be permanently identified as an equipment grounding conductor at each end and at every point. Where the conductor is accessible. Identification shall encircle the conductor and shall be accomplished by one of the following:~~

~~(1) Stripping the insulation of covering from the entire exposed length.~~

~~(2) Coloring the exposed insulation or covering with green.~~

~~(3) Marking the exposed insulation or covering with green tape or green adhesive labels.~~

Substantiation:

Conductors are available in colored insulation for all sizes up to 1000 Kcmil. This would eliminate the chance of a grounding conductor from being miss marked. In turn, eliminating the chance of the electrician from terminating the grounding conductor on the wrong terminal, causing a direct short.

Panel Meeting Action: Reject

Panel Statement:

The submitter did not provide any evidence of a problem with the existing requirement. The submitter has not provided any substantiation for this change.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-221 Log #3202 NEC-P05 **Final Action: Reject**
(250-119(D) (New))

Submitter: Larry G. Watkins, Alcan Cable

Recommendation:

Add paragraph (D) to 250.119:
(D) Raceway. Where used as sole means of equipment ground raceway shall be identified.

Substantiation:

Allows for verification of equipment grounding system components. Possible use of nonmetallic components during installation of repairs could create unintended discontinuity if not identified as sole equipment ground.

Panel Meeting Action: Reject

Panel Statement:

The submitter did not provide any text to indicate the method(s), location or type of identification that is to be applied.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-223 Log #711 NEC-P05 **Final Action: Reject**
(250-120(C))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise:
Where not run with the circuit conductors in a raceway or cable ~~Equipment~~ equipment grounding conductors smaller than 6 AWG shall be protected from physical damage by ~~a~~ an approved raceway or cable armor, except where run in the hollow spaces of construction ~~walls or partitions,~~ or where not likely to be subject to physical damage, or otherwise protected from physical damage and securely fastened to the construction.

Substantiation:

This section appears intended to apply to separately run conductors, where permitted, such as in 250.130(C), 250.134(B) Exception No. 2, 553.13(A)(2), and Articles 225, 394, 396, and 398. However, it literally includes grounding conductors in cables that are not armored types. Other Code rules for installation of nonarmored cables should be sufficient for protection of grounding conductors smaller than 6 AWG contained in the cables.

Panel Meeting Action: Reject

Panel Statement:

The panel is unclear as to the intent of the submitter. This proposal does not accurately reflect the actual text of the 2002 NEC and appears to be incomplete.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-224 Log #761 NEC-P05 **Final Action: Reject**
(250-120(C))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text as follows:
Where not run with the circuit conductors in a raceway or cable ~~E~~ equipment grounding conductors smaller than 6 AWG shall be ~~protected from physical damage by a~~ installed in an approved raceway or cable armor, except where run in the hollow spaces of construction ~~walls or partitions~~, or where not likely to be subject to physical damage, or otherwise protected from physical damage, and securely fastened to the construction.
Exception No. 1: Overhead aerial conductors in accordance with this Code shall be permitted to be smaller than 6 AWG.
Exception No. 2: Conductors shall be permitted to be fished between access points where fastening is impractical.

Substantiation:

This section appears intended to apply to separately run equipment grounding conductors where permitted, such as in 250.130(C), 250.134(B) Exception No. 2, 153.13(A)(2), and Articles 225, 394, 396, and 398. However, it literally includes all equipment grounding conductors in cables that are not armored type. Protection, height, location, burial, and other rules for such unarmored cables should be adequate for any contained equipment grounding conductor.
All hollow spaces are not walls or partitions.
Since everything may be subject to physical damage the phrase "likely to be" is proposed, as is used in 110.27(B), which allows for probability, not possibility.
The type of raceway is not presently indicated, the raceways of Articles 348, 250, 352, 356, 358, 386, and 388 for example have restrictions on use where they may be damaged. An "approved" raceway allows the Authority Having Jurisdiction to judge whether the degree of protection is acceptable.
The proposed exceptions would allow for overhead aerial conductors and those fished.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement Proposal 5-223 (Log #711). The panel concluded the proposed exceptions do not add any clarity.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-226 Log #3078 NEC-P05 **Final Action: Accept**
(Table 250-122)

Submitter: Wally Harris, Atlantic Inland Inspections

Recommendation:

Place lines in Table as indicated to facilitate ease of use.

Insert Table 250.122 Here

(Table shown on page 2727)

Substantiation:

This proposed format will help users, by making the Table more "user friendly" to a reader's eyes.

Panel Meeting Action: Accept

Editorially add 6 horizontal lines to separate the requirements into blocks of three.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-225 Log #3359 NEC-P05 **Final Action: Reject**
(250-122 (New))

Submitter: Mike Weitzel, City of Wenatchee, WA

Recommendation:

Add new text as follows:
Rooftop Installations.
Where raceways not employing threaded couplers and connections are installed on a rooftop and subject to physical damage, the grounding terminals of all receptacles and all non-current carrying conductive surfaces of fixed electric equipment likely to become energized and subject to personal contact, operating at over 50 volts to ground, shall be grounded by an insulated equipment grounding conductor. The equipment grounding conductor shall be sized in accordance with Table 250.122, and installed within the raceway in accordance with 300.3(B).

Substantiation:

Please see photo I have provided (Note: Not received at NFPA). This is a safety and longevity issue, and has come before Code Panels 3 and 8 previously. Roof top installations of raceways that have been installed according to Code and approved are often later subject to unreasonable or unforseen damage during snow removal or roof repair or replacement work. The damaged fault current grounding path has led to shock and injury of electricians that I know, and could lead to electrocution. At the IAEI NW.Section Meeting this fall, the conduit on the roof was damaged as well.

Panel Meeting Action: Reject

Panel Statement:

Section 250.122 deals with the size for equipment grounding conductors and the submitter's proposal is about installation; therefore, the proposed text was for the incorrect location. The panel invites the submitter to submit a comment to clarify the intent in the appropriate Code section.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER: This submitter has again identified a safety hazard that has been pointed out by others in previous Code cycles. There is an obvious problem in the field that could result in a non-safe condition. This hazard is easily corrected by restricting the use of EMT on rooftops.
Also see my Explanation of Negative on Proposal 5-212.

Comment on Affirmative:

BRETT: I support the panel action but disagree with the panel statement. The submitter's substantiation cites conditions that may not have existed on the rooftops at the time of installation. This issue cannot be regulated by the NEC. The code has always required raceways to be properly supported and secured. In geographic areas where heavy snow loads may exist, the designer must foresee the possibility of these issues and design the raceway system accordingly. The proposal is overly restrictive. All proposals over the past several code cycles have cited workmanship issues relating to small sizes (1/2 and 3/4) of metallic and nonmetallic raceways being improperly installed. Physical protection requirements are adequately addressed in each code article.
As a former contractor in Idaho and Arkansas, I never installed raceways on boards directly on rooftops. I either ran the raceways in the ceiling spaces and poked through at each piece of equipment or placed the raceway on racks properly supported. The installation as cited by the submitter relates to an improperly designed and installed installation.
The change is so overly restrictive and the responsibility should remain with the designer.

5-227 Log #1110 NEC-P05 **Final Action: Reject**
(250-122(B))

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Revise text to read as follows:
Where ungrounded circuit conductors are increased in size for voltage drop, future increases in electricity use, or other design considerations that are not required by this code, equipment grounding conductors where installed shall be increased in size by the same ratio.
Exception: Where ground fault protection of equipment is installed, the size of equipment grounding conductors in multiconductor cables shall be permitted to be sized in accordance with 250.122(F)(2).
FPN: The standard equipment grounding wires in cables may not comply with 250.122(B) if oversized cables are used. However re-identification is permitted for equipment ground wires larger than #6. Custom made cables may also be available.

Substantiation:

The present wording gives us no basis for the starting point for determining the ratio of increase. Circuit conductors may need to be increased in size for the ambient temperature, the # of current carrying conductors, or simply because they are being changed from copper to aluminum. These conditions are used to help determine the minimum size REQUIRED by the code for the circuit conductors, but do not require the equipment ground wire to be increased in size. When ungrounded conductors are increased in size for voltage drop or for considerations not REQUIRED by this code, then the ground wires need to be increased in size.
The Exception is needed because certain combinations of cables DO NOT comply. For instance, several cable makers list 3-3, 2-3, 1-3, and 2/0-3 MC cable ALL with the same size #6 ground wire. Normally this ground wire is large enough for the size of the breaker connected to the cable, but these cables won't comply with 250.112(B) because if I need to increase 3-3 MC to any of the other larger sizes (for design reasons) then the #6 ground wire is too small, because the equipment ground wire has not increased in size while the circuit conductors have! This problem exists with other cable types too.
The FPN is needed to alert installers of this problem. With guidance from the FPN, the installer could order a custom cable with a larger ground wire, or a cable with an extra circuit conductor that could be re-identified as an equipment ground wire.

Panel Meeting Action: Reject

Panel Statement:

The present text in 250.122(B) of the 2002 NEC already addresses the submitters concerns.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-228 Log #1707 NEC-P05 **Final Action: Reject**
(250-122(B))

Submitter: Jeffrey L. Howard, R & W Engineering, Inc.

Recommendation:

Revise text as follows:
(B) Increased in Size <u>for Voltage Drop</u>. Where ungrounded conductors are increased in size <u>to compensate for voltage drop</u>, equipment grounding conductors, where installed, shall be increased in size proportionally according to circular mil area of the ungrounded conductors.

Substantiation:

Essentially reverting back to language of 1999 Code, where an increase in equipment grounding conductor is only required for voltage drop compensation.
In parallel runs, the equipment grounding conductor (where used) is required to be run in each of the conduits/raceways of the parallel run. Further, the equipment grounding conductor is required to be "full-size" in each of the conduits/raceways. With the language of the 2002 Code, the equipment grounding conductor may end up being larger than the ungrounded conductors. This is especially true for large parallel runs in underground duct banks, where the ungrounded conductors are increased in size for thermal reasons.

Panel Meeting Action: Reject

Panel Statement:

The change to the 2002 NEC was substantiated by the fact that there are other reasons the ungrounded conductors are increased in size necessitating the proportional increase in size of the equipment grounding conductors. Section 250.122(B) as well as (F) does apply to parallel runs, therefore the substantiation is not valid. Section 250.122(A) already establishes that the equipment grounding conductor does not have to be larger than the ungrounded conductors supplying the circuit.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-229 Log #3195 NEC-P05 **Final Action: Accept**
(250-122(D))

Submitter: Truman C. Surbrook, Michigan State University

Recommendation:

Delete the entire paragraph and replace with the wording shown.

(D) Motor Circuits. ~~Where the overcurrent device consists of an instantaneous trip circuit breaker or a motor short-circuit protector, as allowed in 430.52, the equipment grounding conductor size shall be permitted to be based on the rating of the motor overload protective device but not less than the size shown in Table 250.122.~~ The equipment grounding conductor size shall not be smaller than determined using Table 250.122 based upon 125 percent of the motor full-load current as determined according to 430.6(A)(1).

Substantiation:

The branch-circuit short-circuit and ground-fault protective device for a motor circuit generally has a rating higher than the allowable ampacity of the conductors. Equipment grounding between a controller and the motor is common since flexile connections are often used to make a connection to a motor. Following the rules in 250.122, the equipment grounding conductor size is to be based upon the rating of the branch circuit overcorrect device. Since an instantaneous trip circuit breaker is often sized at 8 times the motor full-load current, a special provision was added as 250.122(D) to prevent an excessive large equipment grounding conductor. I fail to see why this same provision should not be available for all motor branch circuits, and that is what this change attempts to accomplish. The following example determines the minimum permitted size of grounding electrode conductor when a motor circuit is protected by time-delay fuses, an inverse time circuit breaker, and an instantaneous trip circuit breaker. Each results in a different size equipment grounding conductor with the highest rated overcorrect device allowing the smallest equipment grounding conductor.

Example: 20 hp, 3-phase, 230 volt, 54 amp, design B, service factor 1.0 motor. Branch circuit conductor size is 4 AWG (1.25 x 54 A = 68A). If time-delay fuses are used to protect the circuit the maximum rating is 100 amperes (1.75 x 54 A = 95 A). The equipment grounding conductor based upon Table 250.122 is size 8 AWG copper. If an inverse time circuit breaker is used to protect the circuit, the maximum rating is 150 amperes (2.5 x 54 A = 135 A). The equipment grounding conductor based upon Table 250.122 is size 6 AWG copper. If the circuit is protected by an instantaneous trip circuit breaker the maximum rating will be 450 amperes (8 x 54 A = 432 A) and because of the provision in 250.122(D) the equipment grounding conductor is permitted to be based upon a 60 ampere overcorrect device rating (1.15 x 54 A = 62 A). The minimum equipment grounding conductor size would then be 10 AWG copper. If the proposed change is approved, the minimum size equipment grounding conductor for this example would be 8 AWG copper no matter what the rating of circuit overcurrent protection is selected.

I fear there are thousands of improperly sized equipment grounding conductors on motors because the rules for motor circuit equipment grounding conductor sizing are not made clear.

Panel Meeting Action: Accept

Panel Statement:

The panel does not necessarily agree with all of the submitter's substantiation.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

DOBROWSKY: The resulting text does not clearly describe how to size the conductor. Table 250.122 is based on an overcurrent device and the revised text would require a conductor sized at 125 percent of an instantaneous trip circuit breaker.

Comment on Affirmative:

SKUGGEVIG: Correlation with Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor" will be needed.

5-230 Log #3479 NEC-P05 **Final Action: Reject**
(250-122(E))

Submitter: Samuel B. Friedman, General Cable

Recommendation:

Add text to read as follows:
(E) Flexible Cord and Fixture Wire. Equipment grounding conductors that are part of flexible cords or used with fixture wires shall not be smaller than the largest circuit conductor when that conductor is #10 AWG or smaller. When the largest conductor in a flexible cord is #8 AWG or greater the size of the copper grounding conductor shall be in accordance with Table 250.122.

Substantiation:

The revised wording is to ensure that the NEC is in accordance with the present UL/ANSI national standard and present practice for flexible cords and fixture wires. The present wording, although correct for fixture wires, must be revised for flexible cords.

Panel Meeting Action: Reject

Panel Statement:

The substantiation from the submitter to require sizing of the equipment grounding conductor contained within listed cords was insufficient. The product safety standards already establish the minimum equipment grounding conductor requirements for listed cords.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

SKUGGEVIG:: 250.122(E) presently states that the equipment grounding conductor of a flexible cord shall be at least the same size as the circuit conductors (with 18 AWG as the minimum acceptable size). The submitter's proposal attempts to eliminate a discrepancy that now exists between 250.122(E) and the product safety standards. For many years, the product safety standards have allowed flexible cords of sizes 8 AWG and larger to have the equipment grounding conductor of a reduced size that is in accordance with Table 250.122. These larger size cords have demonstrated satisfactory performance for many years in many applications. The submitter is attempting to remedy the discrepancy between the NEC and the product safety standards. Proposal 5-230 should be accepted and correlated with Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".
STEINMAN: The submitter's substantiation is correct.

5-231 Log #3454 NEC-P05 **Final Action: Reject**
(250-122(F)(2))

Submitter: Charles M. Trout, Maron Electric Co. Inc.

Recommendation:

Delete this section in its entirety.

Substantiation:

The National Electrical Code is prescriptive code. To say "where the conditions of maintenance and supervision ensure that only qualified persons service the installation," is a performance requirement. Without prescriptive requirements indicating whether this qualified person is an employee of the owner of the premises or is a separately contracted person and the Authority Having Jurisdiction has a means of verification of the continued employment of the qualified person and whether the qualified person has been verified by the authority having jurisdiction as meeting the definition of a qualified person as shown in the definitions of this Code no prescriptive requirements have been followed.
To permit relaxation of the safety requirements of this Code without establishing a positive guarantee that the safety of persons and property is indisputably assured is a reprehensible act.

Panel Meeting Action: Reject

Panel Statement:

The submitter did not provide any evidence of a problem.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

TOOMER: There should be more controls on the qualified person as to their training and knowledge of the system for the safe maintenance of it.
Add:
Documentation of their qualifications and safety training of the system must be on file with the local authority having jurisdiction.

5-231a Log #CP504 NEC-P05 **Final Action: Accept**
(250-122(F)(2)3)

Submitter: Code-Making Panel 5

Recommendation:

In 250.122(F)(2)(3) Change the words "listed for the purpose" to "... listed for the purpose of protecting the equipment grounding conductor."

Substantiation:

The panel revised the text to remove vague unenforceable term " … for the purpose …", improve clarity, and comply with the NEC Style Manual 3.2.1.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

SKUGGEVIG: Correlation with Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor" will be needed.

5-232 Log #3222 NEC-P05 **Final Action: Accept in Principle**
(250-122(G))

TCC Action:

See the Technical Correlating Committee note on Proposal 5-1.

Submitter: Jonathan R. Althouse, Twin Creeks Enterprises

Recommendation:

Add a new paragraph to 250.122 to deal with equipment grounding conductors for feeder taps.
(G) Feeder Taps. Equipment grounding conductors for a feeder tap shall not be smaller than shown in Table 250.122 for the rating of the feeder overcurrent device but shall not be required to be larger than the largest tap conductor.

Substantiation:

In the case where a tap is connected to a feeder and an equipment grounding conductor is required, the rule is not clear as to how to size the equipment grounding conductor. The situation may be covered by 250.122(A), but this is not clear and does lead to differences in interpretation. For a ground-fault or a short circuit in the tap, the equipment grounding conductor must be capable of carrying the fault current to open the feeder overcurrent device.

Panel Meeting Action: Accept in Principle

250.122(G) Feeder Taps. Equipment bonding conductors run with feeder taps shall not be smaller than shown in Table 250.122 based on the rating of the overcurrent device ahead of the feeder but shall not be required to be larger than the tap conductors.

Panel Statement:

The panel concludes the revised text meets the intent of the submitter and clarifies the proposed text. This proposal has been correlated with Proposal 5-1 (Log #2453e).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: My vote would be affirmative except that the term "equipment bonding conductor" is not acceptable. See my Explanation of Negative on Proposal 5-1.

Comment on Affirmative:

SKUGGEVIG: See my Comment on Affirmative on Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".

5-233 Log #580 NEC-P05 **Final Action: Reject**
(Figure 250-126)

TCC Action:

The Technical Correlating Committee notes that Code-Making Panel 18 took a different action on Proposal 18-48. The Technical Correlating Committee directs the Chair of Code-Making Panel 5 to establish a Task Group, including members from Code-Making Panel 18, to resolve the correlation issue. This action will be considered by the panel as a public comment.

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise to read as follows:
"Figure 250.126 Grounding symbol (with or without circle)."

Substantiation:

The "inverted Christmas tree" grounding symbol is widely used on products of various types, with and without the circle. The current code, illustrating the symbol in a circle causes some confusion in the market and may raise questions as to the meaning of the mark if there is no circle. The requirement is unnecessarily restrictive for wiring device terminals. There is no relative safety issue with either form as it is universally recognized as the ground identification with or without a surrounding circle.

Panel Meeting Action: Reject

Panel Statement:

The present symbol is based on IEC 60417 symbol 5019. The symbol without the circle is also defined by the IEC and has a different defined meaning. After review of the application to terminals intended to carry fault current and provide safety, the panel determined the symbol with the circle is correct. The NEC is used as an international document and is used in many countries where products made under the IEC are installed, therefore the correct symbol should be applied to prevent misunderstandings.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

BRENDER: The inverted Christmas tree symbol is used either with or without the circle by manufacturers in the USA and others. One such example is the radio equipment in the attached picture, which I believe was manufactured by Motorola, and is located in Florida.
The two symbols are used interchangeably and should be recognized as such.
Note: Supporting material is available for review at NFPA Headquarters.
STEINMAN: The IEC recognizes both grounding symbols. Both symbols are applicable to the North American ground practice.
Symbol 5019-a (in the circle) is intended to be applied on any kind of equipment, to identify any terminal which is intended for connection to an external protective conductor for protection against electric shock in case of a fault or the terminal of a protective earth (ground) electrode.
Symbol 5017-a (without the circle) is intended to be applied on any kind of equipment to identify an earth (ground) terminal in cases where the 5019 is not specifically required.

Comment on Affirmative:

JOHNSTON: I concur with the action of the Panel 5 relative to the insertion of an additional grounding symbol without the circuit. These two symbols have different, defined meanings globally and could lead to confusion and safety issues is both are inserted into the NEC. The proposed symbol without the circle by definition means earth connection and is inconsistent with the current symbol in Section 250.126, which is intended to mean not only equipment grounding but also equipment grounding (protective bonding) conductor terminal identification.

5-234 Log #1140 NEC-P05 **Final Action: Reject**
(250-130(D) (New))

Submitter: Ray C. Mullin, Ray C. Mullin / Rep. Ray C. Mullin Books

Recommendation:

Add new section 250.130(D) to read as follows:
(D) GFCI Receptacle(s) on Branch-Circuit Extension. Where a new receptacle(s) is installed and connected to an extension of an existing branch circuit that does not have an equipment grounding means, it shall be permitted to install a GFCI receptacle(s).

Substantiation:

Many times in an older homes (knob and tube...NM without an EGC) an extension is made to add another receptacle. It can be literally impossible or impractical to make a connection as required in 250.130(C). From a safety standpoint, installing a GFCI receptacle will provide the necessary safety from electrical shock.

Panel Meeting Action: Reject

Panel Statement:

For branch circuit extensions, an equipment bonding conductor is required.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-235 Log #2649 NEC-P05 **Final Action: Accept**
(250-140)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Revise existing Section 250.140 as follows:

250.140 Frames of Ranges and Clothes Dryers.

Frames of electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers, and outlet or junction boxes that are part of the circuit for these appliances shall be grounded in the manner specified by 250.134 or 250.138. ~~This section shall apply to existing branch-circuit installations only. New branch-circuit installations shall comply with 250.134 and 250.138. Frames of electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers, and outlet or junction boxes that are part of the circuit for these appliances shall be grounded in the manner specified by 250.134 or 250.138; or, except for mobile homes and recreational vehicles,~~

Exception: For existing branch circuit installations only where an equipment grounding conductor is not present in the outlet or junction box, the frames of electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers, and outlet or junction boxes that are part of the circuit for these appliances shall be permitted to be grounded to the grounded circuit conductor if all the following conditions are met.

(1) The supply circuit is 120/240-volt, single-phase, 3-wire; or 208Y/120-volt derived from a 3-phase, 4-wire, wye-connected system.

(2) The grounded conductor is not smaller than 10 AWG copper or 8 AWG aluminum.

(3) The grounded conductor is insulated, or the grounded conductor is uninsulated and part of a Type SE service-entrance cable and the branch circuit originates at the service equipment.

(4) Grounding contacts of receptacles furnished as part of the equipment are bonded to the equipment.

Substantiation:

As presently worded, this section does not clearly require the frames of electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers, and outlet or junction boxes that are part of the circuit for these appliances to be grounded. It seems the requirement was lost during processing of the 1996 NEC. Sections 250.134 and 250.138 apply only where the appliance or equipment is required to be grounded elsewhere in Article 250 as the phrase "if grounded" is used in both of these sections. The present language of 250.140 simply requires the branch circuit for ranges and dryers to comply with 250.134 or 250.138 but does not clearly require these appliances to be grounded.

It is felt that this section will be more clear if the general rule requires the frames of electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers, and outlet or junction boxes that are part of the circuit for these appliances to be grounded and an exception excludes those appliances supplied by an existing branch circuit.

The phrase "only where an equipment grounding conductor is not present in the outlet or junction box" is proposed to be added to the exception to cover the situation where the existing branch circuit has an equipment grounding conductor available. In this case, the exception should not apply and the appliances and equipment should be grounded by the equipment grounding conductor and not by the neutral.

Finally, it is proposed that the language regarding manufactured homes and recreational vehicles be deleted as Articles 550 and 551 covers installations in these structures or vehicles. In addition, Section 90.3 permits the Articles in Chapter 5 to modify the general rules in Article 250 so this language is not required here. See 550.16 for the grounding requirements in manufactured homes and 551.54(C) for recreational vehicles.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

SKUGGEVIG: Correlation with Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor" will be needed.

5-236 Log #1101 NEC-P05 **Final Action: Reject**
(250-142(B) Exception No. 2 (New))

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add another requirement (d)
"and (d) doing so does not create a parallel path for the grounded circuit conductor."

Substantiation:

The present wording in 250.142(B), Exception No. 2 would allow us to wire a meter with metal pipe and then connect the grounded conductor to meter enclosure, thus creating a parallel path. This is a direct contradiction to 250.6(A), yet 250-142(B), Exception No. 2 appears to permit this. If the meter is mounted to grounded building steel, the steel could be a parallel neutral. I have seen this burn up neutral connections in meter sockets. Isolated neutrals are available.

Panel Meeting Action: Reject

Panel Statement:

See the deletion of this section in Proposal 5-237 (Log #1860).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-237 Log #1860 NEC-P05 **Final Action: Accept**
(250-142(B) Exception No. 2)

Submitter: Andre R. Cartal, Princeton Borough Building Dept.

Recommendation:

Delete Exception No. 2.

Substantiation:

This exception was approved in the 1974/75 cycle. At that time there was a real problem with meter bases installed on the load-side of the service equipment as they all came with the grounded conductor terminal riveted to the enclosure. This is no longer the case as now meter bases are readily available with neutral terminations that can be insulated from the enclosure. In addition, the exception uses the word "near" which is not defined by the NEC. The deletion of this exception will also have the beneficial effect of eliminating neutral current over metal raceways feeding these meters.

Panel Meeting Action: Accept

Editorially renumber the remaining exceptions.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

WHITE: This proposal should be rejected. There can be instances when the meter enclosure is on the load side of the main disconnect but ahead of the point where the equipment bonding conductor has been established. When this is the case, with this change in effect it is possible that the meter enclosure would not be bonded and thereby creating a potential shock hazard. This exception should remain so the meter enclosure can be bonded under these circumstances.

5-238 Log #555 NEC-P05 **Final Action: Reject**
(250-146(A))

Submitter: J. Kevin Vogel, Crescent Electrical Supply

Recommendation:

Revise text to read as follows:
(A) Surface Mounted Box. Where a grounded box is surface-mounted, the equipment bonding jumper is not required if:
(1) There is direct metal-to-metal contact between the device yoke and the box, or
(2) In the case of cover-mounted receptacles, the box and cover combination is listed as providing satisfactory ground continuity between the box and receptacle.

Substantiation:

The proposed wording does not alter the meaning of the 2002 Code language, but is more "user-friendly", since it is easier to understand.

Panel Meeting Action: Reject

Panel Statement:

Panel concludes the revised text does not add clarity.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-239 Log #2486 NEC-P05 **Final Action: Accept**
(250-146(A))

TCC Action:

The Technical Correlating Committee directs that this proposal be forwarded to Code-Making Panel 18 for comment.

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
(A) Surface Mounted Box. Where the box is mounted on the surface, direct metal-to-metal contact between the device yoke and the box shall be permitted to ground the receptacle to the box. Insulating washers shall be removed to ensure direct metal-to-metal contact. This provision shall not apply to cover-mounted receptacles unless the box and cover combination are listed as providing satisfactory ground continuity between the box and the receptacle.

Substantiation:

Although this requirement presently exists, some are interpreting the screw contacting the device strap and threaded into the box as providing direct metal to metal contact. Adding this sentence removes the question and improves clarity.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

STEINMAN: It is not necessary to remove the washers to establish an effective grounding path for Listed receptacles.

5-238a Log #CP505 NEC-P05 **Final Action: Accept**
(250.146(B))

Submitter: Code-Making Panel 5

Recommendation:

Change "listed for the purpose" to "listed as self-grounding"

Substantiation:

The panel revised the text to remove vague unenforceable terms, improve clarity, and comply with the NEC Style Manual 3.2.1.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

SKUGGEVIG: Correlation with Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor" will be needed. In the context of the new terminology accepted in Proposal 5-1, the yoke of the receptacle is "bonded" to the outlet box, not "grounded" to the box.

5-240 Log #1225 NEC-P05 **Final Action: Reject**
(250-146(D))

Submitter: Melanie Roberts, Belco Electric

Recommendation:

Revise text to read as follows:

"This grounding conductor shall be permitted to pass through one or more panelboards without connection to the panelboard grounding terminal as permitted in the Exception of 408.20~~, Exception,~~ so as to terminate within the same building or structure directly at an equipment grounding conductor terminal of the applicable...".

Substantiation:

The suggested wording is free of unnecessary and potentially confusing punctuation.

Panel Meeting Action: Reject

Panel Statement:

The present text is in accordance with the NEC Style Manual, Section 4.1.2.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-241 Log #1723 NEC-P05 **Final Action: Reject**
(250-146(D))

Submitter: Michael J. Johnston, Int'l Assn. of Electrical Inspectors

Recommendation:

Revise text to read as follows:

(D) Isolated Receptacles. Where required for the reduction of electrical noise (electromagnetic interference) on the grounding circuit, a receptacle in which the grounding terminal is purposely insulated from the receptacle mounting means shall be permitted. The receptacle grounding terminal shall be grounded by an insulated equipment grounding conductor run with the circuit conductors. This grounding conductor shall be permitted to pass through one or more panelboards without connection to the panelboard grounding terminal as permitted in 408.20, Exception, so as to terminate within the same building or structure directly at an equipment grounding conductor terminal of the applicable derived system or service. Supplementary grounding electrodes installed for use with equipment and equipment grounding conductors in accordance with this section shall meet the requirements of Section 250.54 and the insulated equipment grounding conductor shall meet the requirements of 250.4(A)(5).

FPN: Use of an isolated equipment grounding conductor does not relieve the requirement for grounding the raceway system and outlet box.

Substantiation:

This revision should provide clarification that isolated (insulated) equipment grounding conductors must also provide an effective ground-fault current path that meets the performance criteria specified in Section 250.4(A)(5). The earth shall not be used as the sole equipment grounding conductor or any equipment grounding conductor. There is considerable confusion in the field relative to the concept of "clean" grounds as compared to "dirty" grounds. Both are safety circuits required to provide an effective ground-fault current path back to the point of grounding for the applicable service or separately derived system. The revision does not change or add any new requirements to the Code, just clear reference to other directly related sections.

Panel Meeting Action: Reject

Panel Statement:

Proposed wording may increase confusion by introducing the concept of supplementary grounding electrodes in the section on isolated receptacles. Section 250.4 applies to all parts of Artcle 250.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-242 Log #2796 NEC-P05 **Final Action: Reject**
(250-146(D))

Submitter: Dale Rooney, Municipality of Anchorage

Recommendation:

Add text to the last sentence as follows:
The insulated equipment grounding conductor for isolated receptacles shall not be used to ground intervening raceways, enclosures or non-isolated receptacles.

Substantiation:

The term "isolated ground" is not defined and the code text permits but does not require this isolation. Improper installation can result in problems with equipment operation.

Panel Meeting Action: Reject

Panel Statement:

Utilization of isolated grounding is primarily intended for equipment performance and safety. How it is connected and where it is grounded is an engineering consideration.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-243 Log #3431 NEC-P05 **Final Action: Reject**
(250-146(D))

Submitter: Robert Schuerger, EYP Mission Critical Facilities, Inc.

Recommendation:

Revise as follows:
(D) ~~Isolated~~ Insulated Grounding Receptacles. Where required for the reduction of electrical noise (electromagnetic interference) on the grounding circuit, a receptacle in which the grounding terminal is purposely insulated from the receptacle mounting means shall be permitted. The receptacle grounding terminal shall be grounded by a ~~insulated~~ dedicated equipment grounding conductor run with the circuit conductors. This dedicated equipment grounding conductor shall be permitted to pass through one or more panelboards without connection to the panelboard grounding terminal as permitted in 408.20, Exception, so as to terminate within the same building or structure directly at an equipment grounding conductor terminal of the applicable derived system or service.
FPN: Use of ~~an isolated~~ dedicated equipment grounding conductor does not relieve the requirement for grounding the raceway system and outlet box.

Substantiation:

The use of the term "isolated" has caused confusion which has led to improper and unsafe installations in which a separate grounding electrode and grounding system is installed isolated from the rest of the building's grounding system. Since the separate grounding system is not properly bonded to the building's grounding system, a significant voltage can be developed between the two grounding systems in the case of ligntning or an electrical fault. This creates a significant hazard for both personal injury and fire. There have been many cases of this type of installation in the past, particularly with machine tools, data processing equipment and other sensitive electronic equipment installations.
Changing "isolated" to "insulated" also brings this section in alignment with the existing section 517.16 Receptacles with Insulated Grounding Terminals.
This text is also being proposed for the revision of IEEE Std. 1100, Powering and Grounding Electronic Equipment.

Panel Meeting Action: Reject

Panel Statement:

The panel does not agree with the submitter's terminology. Insulated applies to the terminal and the conductor not the receptacle design. Dedicated implies only one device can be on the isolated grounding circuit which is not the intent of this section. Panel concludes the revised text does not add clarity.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

RAPPAPORT: I agree that the term "isolated" is inappropriate as it leads some to believe that they can provide a separate grounding electrode for the receptacle without a connection to the electrical power source system grounding electrode. The proposed terms are also inadequate in that they imply conditions that are not intended. The Submitter is encouraged to develop better terminology that could be accepted.

5-244 Log #3162 NEC-P05 **Final Action: Reject**
(250-146(D), FPN)

Submitter: Eric Stromberg, The Dow Chemical Company

Recommendation:

Change the word "isolated" to "insulated".

Substantiation:

Bring the wording of the FPN into alignment with paragraph D.

Panel Meeting Action: Reject

Panel Statement:

The term isolated is describing the design of the receptacle in combination with an insulated equipment grounding conductor.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

RAPPAPORT: See my Comment on Affirmative on Proposal 5-243.

5-244a Log #CP501 NEC-P05 **Final Action: Accept**
(250-147(NEW))

TCC Action:

See the Technical Correlating Committee Note on Proposal 5-1.

The Technical Correlating Committee directs the panel to reconsider the proposal and ensure that any language used in Article 250 is consistent with 404.9. This action will be considered by the panel as a public comment.

The Technical Correlating Committee notes that the responsibility of determining how a snap switch should be grounded belongs to Code-Making Panel 9.

It was the further action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 9 for comment.

Submitter: Code-Making Panel 5

Recommendation:

Add new 250.47 to read:

250.147 Bonding of General-Use Snap Switches. Snap switches, including dimmer and similar control switches, shall be connected to the equipment bonding conductor and shall provide a means to bond metal faceplates, whether or not a metal faceplate is installed. Snap switches shall be bonded by either of the following conditions.

(1) The switch is mounted with metal screws to a metal box or to a nonmetallic box with integral means for bonding the devices.

(2) An equipment bonding conductor or equipment bonding jumper is connected to the terminal for connecting the equipment bonding conductor.

Exception: Where no equipment bonding conductor exists within the snap-switch enclosure, a snap switch without a terminal for connecting the equipment bonding conductor shall be permitted for replacement purposes only. A snap switch wired under the provisions of this exception and located within reach of earth, grade conducting floors, or other conducting surfaces shall be provided with a faceplate of nonconducting, noncombustible material.

Substantiation:

The proposed new text adds requirements for bonding of switches to Article 250. The panel concludes that this is a logical location for the requirements for bonding of switches as it follows the requirements of 250.146 for the bonding of receptacles. CMP-5 refers this to CMP-9 for information.

Panel Meeting Action: Accept

Panel Statement:

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: My vote would be affirmative except that the term "equipment bonding conductor" is not acceptable. See my Explanation of Negative on Proposal 5-1.

Comment on Affirmative:

JOHNSTON: I concur with the action of the Panel 5 to include requirements for bonding of snap switches at outlets that are consistent with those requirements for grounding receptacles. This change is also consistent with the action of Panel 9 to similar proposals to incorporate the requirements in Article 404 under switches.

SKUGGEVIG: See my Comment on Affirmative on Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".

5-245 Log #830 NEC-P05 **Final Action: Reject**
(250-148)

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise:
Continuity And Attachment of Grounding and Bonding Conductors. ~~Where circuit conductors are spliced within a box, or terminated on equipment within or supported by a box,~~ Where more than one separate equipment grounding or bonding conductor ~~associated with the circuit conductors~~ enters a box they shall be spliced or joined within the box ~~or to the box~~ with devices suitable for the use. Connections depending solely on solder shall not be used. Splices shall be made in accordance with 110.14(B) except that insulation shall not be required. The arrangement of grounding and bonding conductors shall be... (remainder unchanged).

Substantiation:

Conductors designated as equipment bonding conductors may be installed in raceways (250.102(E)) and enter enclosures. Effectively,b they are the same as equipment grounding conductors and the requirements should be applicable. Subsection (A) covers connection to metal boxes. The deleted portion seems irrelevant to the rule.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not provided substantation for this proposal. The submitter indicated changes to text that is not actually in the 2002 NEC. The deleted text is necessary for the application of this rule.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-246 Log #1468 NEC-P05 **Final Action: Reject**
(250-148)

Submitter: Jamie McNamara Hastings, MN

Recommendation:

I underlined added text and put a strike through deleted text.
250.148 Continuity and Attachment of Equipment Grounding Conductors to Boxes.
Where circuit conductors are spliced within a box, or terminated on equipment within or supported by a box, all ~~any separate~~ equipment grounding conductors ~~associated with those circuit conductors~~ shall be spliced or joined within the box or to the box with devices suitable for the use. Connections depending solely on solder shall not be used. Splices shall be made in accordance with 110.14(B) except that insulation shall not be required. The arrangement of grounding connections shall be such that the disconnection or the removal of a receptacle, luminaire (fixture), or other device fed from the box will not interfere with or interrupt the grounding continuity.
Exception: The equipment grounding conductor permitted in 250.146(D) shall not be required to be connected to the other equipment grounding conductors or to the box.

Substantiation:

To make it clear all equipment grounding conductor that terminated on equipment within or supported by a box are to tie together. An example is with two fourteen two NM cables run to a two gang nonmetallic box not having the equipment grounding conductors not tied together but going straight to and grounding the switches. Tying the equipment grounding conductors together as was required in the 1999 NEC keeps the impedance path low.

Panel Meeting Action: Reject

Panel Statement:

The submitter's wording is creating a requirement for all equipment grounding conductors passing through a box to be spliced. This contradicts the submitters substantiation which pertains only to equipment grounding conductors for equipment within or supported by the box.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-248 Log #2650 NEC-P05 **Final Action: Accept in Principle**
(250-148)

TCC Action:

See the Technical Correlating Committee Note on Proposal 5-1.

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Revise existing Section 250.148 as follows:

250.148 Continuity and Attachment of Equipment Grounding Conductors to Boxes.

Where circuit conductors are spliced within a box, or terminated on equipment within or supported by a box, any ~~separate~~ equipment grounding conductor(s) associated with those circuit conductors shall be spliced or joined within the box or to the box with devices suitable for the use in accordance with (A) through (E).

Exception: The equipment grounding conductor permitted in 250.146(D) shall not be required to be connected to the other equipment grounding conductors or to the box.

~~Connections depending solely on solder shall not be used.~~

(A) Connections. Connections and splices shall be made in accordance with 110.14(B) except that insulation shall not be required.

(B) Grounding Continuity. The arrangement of grounding connections shall be such that the disconnection or the removal of a receptacle, luminaire (fixture), or other device fed from the box will not interfere with or interrupt the grounding continuity.

~~*Exception: The equipment grounding conductor permitted in 250.146(D) shall not be required to be connected to the other equipment grounding conductors or to the box.*~~

(C) ~~(A)~~ Metal Boxes. The A connection shall be made between the one or more equipment grounding conductors and a metal box by means of a grounding screw that shall be used for no other purpose or a listed grounding device.

(D) ~~(B)~~ Nonmetallic Boxes. One or more equipment grounding conductors brought into a nonmetallic outlet box shall be arranged so that a connection can be made to any fitting or device in that box requiring grounding.

(E) Solder. Connections depending solely on solder shall not be used.

Substantiation:

This proposal is intended to be an editorial improvement to this section. As presently written, subsections (A) and (B) seem to modify and be in conflict with the opening paragraph. The opening paragraph requires an equipment grounding connection to a metal box only where circuit conductors are spliced within a box, or terminated on equipment within or supported by a box. The present wording of (A) requires the connection in all arrangements as does the existing (B).

It is also intended to break up the existing long paragraph into individual subsections with titles for clarity and user-friendliness.

Finally, it is proposed to delete the word "separate" in the opening paragraph as it is unclear what it refers to. What is a "separate" equipment grounding conductor, one that is not required but is voluntarily installed?

Panel Meeting Action: Accept in Principle

Change "Equipment grounding conductor" to "equipment Bonding conductor" in accordance with Panel Action and Statement on Proposal 5-1 (Log #2453e). Editorially delete the proposed word "The" in 250.148(C)

Panel Statement:

Panel concludes that this meets the submitters intent.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

RAPPAPORT: My vote would be affirmative except that the term "equipment bonding conductor" is not acceptable. See my Explanation of Negative on Proposal 5-1.

Comment on Affirmative:

JOHNSTON: I concur with the action of Panel 5 to accept the proposal concept and incorporate the new layout for the requirements of the section. This revision should improve clarity of the requirements of the installer and inspector.

SKUGGEVIG: See my Comment on Affirmative on Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".

5-247 Log #2389 NEC-P05 **Final Action: Reject**
(250-148 & 250.148(A))

Submitter: Bill Poindexter, APC-Natchig

Recommendation:

Revise to read as follows:
"Where circuit conductors are spliced within a box, or terminated on equipment within or supported by a box, any separate equipment grounding conductors, including supplementary grounding conductors, associated...." (remainder to be unchanged)
Revise subsection to read as follows:
"A connection shall be made between the one or more equipment grounding conductors, including supplementary grounding conductors, and a metal box...." (remainder to be unchanged)

Substantiation:

Where supplementary grounding conductor(s) are installed, they should be joined with the equipment grounding system at each location where the equipment grounding conductor(s) are spliced and joined to the box. Where a supplementary equipment grounding conductor is installed inside of a metal raceway, for any number of reasons, this should be treated as any other standard equipment grounding conductor. Another example is smooth or corrugated sheath MC cable where internal grounding conductor(s) are installed in the manufacturing process. They should be treated as part of the equipment grounding system and joined or spliced in the box even if the sheath is being used as the equipment grounding conductor. There is no official definition of a supplementary equipment grounding conductor though this term is used in 250.96(A). I have seen numerous instances where an internal grounding conductor was not electrically connected to the metal box because it was classified as a “supplementary equipment grounding conductor”. This revision will clarify that all equipment grounding conductors, including supplementary, fall under the requirements of this section.

Panel Meeting Action: Reject

Panel Statement:

The panel concludes that this proposed text is not required. Supplementary equipment bonding conductors are considered equipment bonding conductors and are already covered by this section.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-249 Log #3432 NEC-P05 **Final Action: Reject**
(250-148 Exception)

Submitter: Robert Schuerger, EYP Mission Critical Facilities, Inc.

Recommendation:

Revise as follows:
Exception: The dedicated equipment grounding conductor permitted in 250.146(D) shall not be required to be connected to the other equipment grounding conductors or to the box.

Substantiation:

Adding "dedicated" brings this section in alignment with the proposed definition and change to 250.146(D).

Panel Meeting Action: Reject

Panel Statement:

Dedicated implies only one device can be on the isolated grounding circuit which is not the intent of this section. Panel concludes the revised text does not add clarity.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

RAPPAPORT: I agree that the term "dedicated" is inappropriate as it leads some to believe that it implies only one device while others consider it to mean that both grounded and ungrounded conductor are used only by the specified receptacle(s). The proposed term is inadequate in that it implies a condition that may not be intended. The Submitter is encouraged to develop better terminology that could be accepted.

5-250 Log #613 NEC-P05 **Final Action: Accept in Part**
(250-168)

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise: Direct-Current Bonding Jumper. For a grounded system, an unspliced bonding jumper shall be used to connect the equipment grounding conductor(s) to the grounded conductor of the system at the source where the system is grounded. For a dc system the size of the bonding jumper shall not be smaller than the system grounding electrode conductor specified in 250.166, and shall comply with the provisions of 250.28(A), (B), and (C).

Substantiation:

There doesn't appear to be a specific requirement for a bonding conductor connecting a system grounded conductor and equipment grounding conductors in Part VIII. Section 250.28 applies to ac systems, 250.34(C) covers bonding of portable and vehicle-mounted dc generators but no specifics re: size, material, attachment, are covered.

Panel Meeting Action: Accept in Part

The panel accepts the insertion of the word "electrode" and rejects all other changes. The panel notes that the accepted change should apply to the actual 2002 NEC language.

Panel Statement:

Section 250.28 does not exclude DC systems. Therefore the rejected portion of the proposed text is not needed.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-251 Log #3367 NEC-P05 **Final Action: Reject**
(250-181)

Submitter: Donald W. Zipse, Zipse Electrical Engineering, Inc.

Recommendation:

250.181 Neutral Grounding.
All current carrying conductors shall be insulated and isolated from earth/ground.
Exception: The neutral conductor may be connected to earth/ground at one location only.

Substantiation:

The multigrounding of the neutral results in uncontrolled flow of current across the earth causing harm to animals, cows and pigs to humans. For the latest human electrical problems resulting from multigrounded neutrals and stray current also know (incorrectly) as stray voltage see www.app.com and scroll down to "stray voltage" where there are over a dozen articles of persons in NJ with problems with multigrounded neutrals.

California Public Service Commission has prohibited using the earth as a return conductor, either partial or total since 1994.

Multigrounded neutral electrical distribution systems are inherently hazardous and dangerous. Otherwise why would the Attorney General of Michigan be bringing cause in the PUC against a utility that admits that 70 percent of the return current flows uncontrolled over the earth causing fatal harm to cows.

Multiple legal cases are in the courts against the utilities now for causing harm against animals and humans. Wisconsin Supreme court has in front of it such a suit requiring the utility to rewire the distribution system to a farm.

Multigrounded neutral distribution systems are in violation of 90.1(A).

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 5-257 (Log #3370).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-252 Log #2733 NEC-P05 **Final Action: Reject**
(250-184)

Submitter: Melvin K. Sanders, TECo., Inc.

Recommendation:

Add text to read as follows:
"The shield shall be permitted to be the grounded (neutral) conductor for single phase circuits where installed in accordance with Section 300.50 for underground installations."

Substantiation:

This will recognize the present practice where single-phase transformers are installed that have one or both windings rated over 600 volts, nominal, and are supplied by underground cables. Industrial polyphase systems over 600 volt, nominal, do not utilize a system grounded (neutral) conductor.

The 2002 NEC text poses a conflict with Section 310.6. With cable shielding required for all cables rated over 2000 volt, nominal, and if a separate grounded (neutral) conductor is present, the grounded conductor and shield will be in parallel electrically and Section 310.4 conditions can not be met. With this provision, engineering review can provide for any resulting conductor thermal concerns.

Panel Meeting Action: Reject

Panel Statement:

The panel can not determine where these words should be added in 250.184.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-253 Log #3038 NEC-P05 (250-184) **Final Action: Accept in Principle**

TCC Action:

See the Technical Correlating Committee Note on Proposal 5-1.

Submitter: Elliot Rappaport, Electro Technology Consultants

Recommendation:

Revise Section 250.184 to include provisions for single point grounded systems, as follows:

250.184 Solidly Grounded Systems. Solidly grounded systems shall be permitted to be either single point grounded or multigrounded neutral. A premises system supplied from a multigrounded neutral supply system service shall be multigrounded neutral.

(A) Neutral Conductor

(1) The minimum insulation level for neutral conductors shall be 600 volts.

Exception No. 1: Bare copper conductors shall be permitted to be used for the neutral of service entrances and the neutral of direct buried portions of feeders.

Exception No. 2: Bare conductors shall be permitted for the neutral of overhead portions installed outdoors.

FPN: See 225.4 for conductor covering within 3.0 m (10 ft) of any building or structure.

(2) The neutral grounded conductor shall be permitted to be a bare conductor if isolated from phase conductors and protected from physical damage.

(3) The neutral conductor shall be of sufficient ampacity for the load imposed on the conductor but not less than 33-1/3 percent of the ampacity of the phase conductors.

Exception: In industrial and commercial premises under engineering supervision, it shall be permissible to size the neutral conductor to not less than 20 percent of the ampacity of the phase conductor.

(B) Multigrounded Neutral Systems

(1) The multigrounded neutral conductor shall be grounded at each transformer and at other additional locations by connection to a made or existing electrode.

(2) At least one grounding electrode shall be installed and connected to the multigrounded neutral circuit conductor every 400 m (1300 ft).

(3) The maximum distance between any two adjacent electrodes shall not be more than 400 m (1300 ft).

(4) In a multigrounded shielded cable system, the shielding shall be grounded at each cable joint that is exposed to personnel contact.

(C) Single Point Grounded System. A single point grounded system shall be permitted and shall be grounded only at the source of a separately derived system.

(1) A separate equipment grounding conductor shall be provided to each building, structure, and equipment enclosure.

(2) A separate neutral shall only be required where phase to neutral loads are supplied.

(3) The neutral, where provided, shall be insulated and isolated from earth except at one location.

(4) An equipment grounding conductor shall be run with the phase conductors; and

(a) shall not carry continuous load current;

(b) may be bare or insulated; and

(c) shall have sufficient ampacity for fault current duty.

Substantiation:

Multigrounded neutral systems are standard with utilities and may be necessary for the safety of line personnel. As has been documented in previous Code proposal substantiations, multigrounding results in some neutral current flowing through the ground with the potential for serious physiological effects on humans and animals. The Code presently permits this method for premises wiring systems but does neither permit nor prohibit the use of single point grounding systems which are required for grounded systems below 1kV. Industrial plants do not use multigrounded systems because neutral current would flow on water piping, sprinkler systems, process piping, and electrical conduits and would present an undesirable safety hazard to plant personnel.

The purpose of this Code change is to provide a positive alternative for grounding rather than arguing with an inspector that "because it isn't prohibited, it is permitted".

No substantive changes have been made to the wording in the 2002 NEC with regard to multigrounded neutral systems. New text is underlined and the remaining text is relocated. 250.184(B) has been deleted because it is covered in the proposed 250.184(B).

Panel Meeting Action: Accept in Principle

Revise Section 250.184 to read:

250.184 Solidly Grounded Neutral Systems. Solidly grounded systems shall be permitted to be either single point grounded or multigrounded neutral.

(A) Neutral Conductor.

(1) The minimum insulation level for neutral conductors shall be 600 volts.

Exception No. 1: Bare copper conductors shall be permitted to be used for the neutral of service entrances and the neutral of direct buried portions of feeders.

Exception No. 2: Bare conductors shall be permitted for the neutral of overhead portions installed outdoors.

FPN: See 225.4 for conductor covering within 3.0 m (10 ft) of any building or structure.

(2) The neutral grounded conductor shall be permitted to be a bare conductor if isolated from phase conductors and protected from physical damage.

(3) The neutral conductor shall be of sufficient ampacity for the load imposed on the conductor but not less than 33-1/3 percent of the ampacity of the phase conductors.

Exception: In industrial and commercial premises under engineering supervision, it shall be permissible to size the neutral conductor to not less than 20 percent of the ampacity of the phase conductor.

(B) Single Point Grounded System. A single point grounded system shall be permitted to be supplied from:

(a) a separately derived system, or

(b) a multigrounded neutral system with an equipment bonding conductor connected to the multigrounded neutral at the source of the single point grounded system.

~~the single point grounded system.~~
(1) A grounding electrode shall be provided for the system.
(2) A grounding electrode conductor shall connect the grounding electrode to the system neutral.
(3) A bonding jumper shall connect the equipment bonding conductor to the grounding electrode conductor.
(4) An equipment bonding conductor shall be provided to each building, structure, and equipment enclosure.
(5) A neutral shall only be required where phase to neutral loads are supplied.
(6) The neutral, where provided, shall be insulated and isolated from earth except at one location.
(7) An equipment bonding conductor shall be run with the phase conductors and
(a) shall not carry continuous load current;
(b) may be bare or insulated; and
(c) shall have sufficient ampacity for fault current duty.
(C) Multigrounded Neutral Systems
(1) The multigrounded neutral conductor shall be grounded at each transformer and at other additional locations by connection to a made or existing electrode.
(2) At least one grounding electrode shall be installed and connected to the multigrounded neutral circuit conductor every 400 m (1300 ft).
(3) The maximum distance between any two adjacent electrodes shall not be more than 400 m (1300 ft).
(4) In a multigrounded shielded cable system, the shielding shall be grounded at each cable joint that is exposed to personnel contact.

Panel Statement:

Revised Section 250.184 to provide a more logical layout and to included specific provisions for Single Point Grounded Systems. The second sentence in the proposal was deleted and additional text was added in (B) to indicate that a Single Point Grounded system for a premises could be obtained from a Multigrounded Neutral system. "Equipment grounding conductor" was changed to "equipment bonding conductor" in accordance with panel action on 5-1 (Log #2453e). Additionally, the Single Point Grounded System was inserted ahead of the Multigrounded Neutral System.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON: The reorganization provides a more logical layout for this section. Incorporating single point grounding requirements in this section also provides rules that are consistent with industry practices where single point grounding is the method chosen for grounded systems in this voltage range. There still appears to be a need for clear performance language in the beginning of Part X of this article to draw distinct differentiation between the performance requirements of these systems as compared to systems 600 volts or less.

SKUGGEVIG: See my Comment on Affirmative on Proposal 5-1 regarding changing the term "equipment grounding conductor" to "equipment bonding conductor".

WHITE: I agree with the Panel's motion on this proposal to Accept in Principle. However, I don't agree with the panel's action. In order to clearly describe and add the desired specific provisions, I think the proposed text should be reworded as follows:

Delete the word neutral at the end of this sentence "250.184 Solidly Grounded Neutral Systems. Solidly grounded systems shall be permitted to be either single point grounded or multigrounded ~~neutral~~.

Item (A)(2) should be rewritten as Exception No. 3 to (A)(1).

Item (A)(3) should be renumbered as (A)(2).

Add the words "Where a single point grounded neutral system is used, the following shall apply:" after the new section title "(B) Single Point Grounded System".

The words "A single point grounded system shall be permitted to be supplied from:" that are part of the title for (B) should become item (B)(1).

The remaining items under (B) should be renumbered accordingly.

Add the words "Where a multigrounded neutral system is used, the following shall apply:" after the new section title "(C) Multigrounded Neutral Systems"

The following words should be added as a new part (1) under Section (C).

(1) The neutral of a solidly grounded neutral system shall be permitted to be grounded at more than one point. Grounding shall be permitted at one or more of the following locations:
(a) Transformers supplying conductors to a building or other structure
(b) Underground circuits where the neutral is exposed
(c) Overhead circuits installed outdoors

The remaining items under (C) should be renumbered accordingly.

5-254 Log #3368 NEC-P05 **Final Action: Reject**
(250-184(A) Exception No. 1)

Submitter: Donald W. Zipse, Zipse Electrical Engineering, Inc.

Recommendation:

Delete the following:
250.184(A) Exception No. 1.

Substantiation:

The bare neutral results in uncontrolled flow of current across the earth causing harm to animals, cows and pigs and to humans. For the latest human electrical problems resulting from multigrounded neutrals & stray current also know (incorrectly) as stray voltage see www.app.com and scroll down to "stray voltage" where there are over a dozen articles of persons in N.J. with problems with multigrounded neutrals.

California Public Service Commission has prohibited using the earth as a return conductor, either partial or total since 1994.

Multigrounded neutral electrical distribution systems are inherently hazardous and dangerous. Otherwise, why would the Attorney General of Michigan be bringing cause in the PUC against a utility that admits that 70 percent of the return current flows uncontrolled over the earth causing fatal harm to cows.

Multiple legal cases are in the courts against the utilities now for causing harm against animals and humans. Wisconsin Supreme court has in front of it such a suit requiring the utility to rewire the distribution system to a farm.

Multigrounded neutral distribution systems are in violation of 90.1(A).

Next legal suits will probably be against the NEC and NESC for allowing multigrounded neutral distribution systems, which result in harm to humans since multigrounded neutral distribution systems are in violation of 90.1(A).

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 5-257 (Log #3370).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-255 Log #3369 NEC-P05 **Final Action: Reject**
(250-184(A) Exception No. 2)

Submitter: Donald W. Zipse, Zipse Electrical Engineering, Inc.

Recommendation:

Insert after the end, "...installed outdoors" when insulated from earth/ground.

Substantiation:

Bare conductors are acceptable when installed on insulators that insulate the bare neutral from ground preventing no more than one connection to earth of the neutral, which is usually and preferred to be at the transformer.

The multigrounded neutral distribution system came into use after the Second World War. One of the first institute of Electrical and Electronic Engineers' technical paper was published in 1946 and it detailed the savings in installation costs - no words about safety as the hazardous and dangerous effects of the multigrounded neutral distribution system were not known until about 1980.

One less wire, one less fuse cutout, one less lightning arrester, less insulators, the list goes on and on of the cost savings.

Do not forget Zipse's Law.

The multigrounding of the neutral results in uncontrolled flow of current across the earth causing harm to animals, cows and pigs and to humans. For the latest human electrical problems resulting from multigrounded neutrals & stray current also know (incorrectly) as stray voltage see www.app.com and scroll down to "stray voltage" where there are over a dozen articles of persons in NJ with problems with multigrounded neutrals.

California Public Service Commission has prohibited using the earth as a return conductor, either partial or total since 1994. There are no reports of stray current from the utilities electrical distribution systems.

Multigrounded neutral electrical distribution systems are inherently hazardous and dangerous. Otherwise why would the Attorney General of Michigan be bringing cause in the PUC against a utility that admits that 70 percent of the return current flows uncontrolled over the earth causing fatal harm to cows.

Multiple legal cases are in the courts against the utilities now for causing harm against animals and humans. Wisconsin Supreme court has in front of it such a suit requiring the utility to rewire the distribution system to a farm.

Next legal suits will probably be against the NEC and the NESC for allowing multigrounded neutral distribution systems, which result in harm to humans since multigrounded neutral distribution systems are in violation of Section 90.1(A).

Do not fall for the misapplication of words - it is not inherent for an electrical distribution system to have stray current flowing uncontrolled over the earth.

It is inherent with multigrounded neutral electrical distribution systems to have stray current flowing uncontrolled continuously over the earth. Only multigrounded neutral electrical distribution systems, not any other type of electrical distribution systems, have uncontrolled continuous flow of stray current over the earth.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 5-257 (Log #3370).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-256 Log #1835 NEC-P05 **Final Action: Reject**
(250-184(A) Exception No. 3 (New))

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 7 for action in the articles under its purview. This action will be considered by Code-Making Panel 7 as a public comment.

Submitter: David Beach, PAE Consulting Engineers

Recommendation:

Add an exception to read as follows:
Exception No. 3: The concentric neutral of listed 2 conductor assemblies shall be permitted to be used. The concentric neutral of single phase circuits shall have an ampacity rated 100 percent of the phase conductor ampacity. The concentric neutral of three phase circuits shall have a minimum ampacity rated 33 percent of the phase conductor ampacity.

Substantiation:

Concentric neutral cables have a long history and have been widely used under NESC requirements. Use of concentric neutral cables under NEC requirements seems to be caught in a chicken and egg situation. The code does not recognize the use of the cables because there are no listed products, and the manufacturers have not listed their products because the code does not allow the use of listed concentric neutral cable assemblies. This proposal will not change the existing situation immediately, but will encourage the development of product standards and listing of products.

Panel Meeting Action: Reject

Panel Statement:

Although the panel is generally supportive with this concept, all the actions needed are not within the scope of CMP-5. CMP-5 recommends to the Technical Correlating Committee to forward this proposal to CMP-6 and CMP-7 for action.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-257 Log #3370 NEC-P05 **Final Action: Reject**
(250-184(B), (C) and (D))

Submitter: Donald W. Zipse, Zipse Electrical Engineering, Inc.

Recommendation:

Delete 250.184(B) and (C) and (D).

Substantiation:

Additional words added to the substantiation from previous submittals - please read.

The multigrounded neutral distribution system came into use after the Second World War. One of the first Institute of Electrical and Electronic Engineers' technical papers on multigrounded neutral distribution systems was published in 1946 and it detailed the savings in installation costs - no words about safety as the hazardous and dangerous effects of the multigrounded neutral distribution system were not known or recognized until about 1980.

One less wire, one less fuse cutout, one less lightning arrester, less insulators, the list goes on and on of the cost savings.

Many farms were not still connected to the electrical distribution systems and those that were had only a well pump and a cream separator along with resistance loads such as lights, ovens and hot water heaters. The loads were small and insufficient amounts of stray current flowed over the earth and did little harm then. As the electrical loads increased more and more electric current flowed over the earth resulting in more and more harm.

Farmers were forced out of the business. Just last year on one farm alone five cows died per day, over 1800 per year - the herd was replaced twice - as a result of stray current emanating from the utility multigrounded neutral distribution system. Cows will not drink since they get shocked. Without water, they develop mastitis and die.

Do not forget Zipse's Law.

The multigrounding of the neutral results in uncontrolled flow of current across the earth causing harm to animals, cows and pigs and to humans. For the latest human electrical problems resulting from multigrounded neutrals & stray current also know (incorrectly) as stray voltage see www.app.com and scroll down to "stray voltage" where there are over a dozen articles of persons in NJ with problems with multigrounded neutrals.

California Public Service Commission has prohibited using the earth as a return conductor, either partial or total since 1994. There are no reports of stray current from the utilities electrical distribution systems.

Multigrounded neutral electrical distribution systems are inherently hazardous and dangerous. Otherwise why would the Attorney General of Michigan be bringing cause in the PUC against a utility that admits that 70 percent of the return current flows uncontrolled over the earth causing fatal harm to cows.

Multiple legal cases are in the courts against the utilities now for causing harm against animals and humans. Wisconsin Supreme court has in front of it such a suit requiring the utility to rewire the distribution system to a farm.

Next legal suits will probably be against the NEC and the NESC for allowing multigrounded neutral distribution systems, which result in harm to humans since multigrounded neutral distribution systems are in violation of Section 90.1(A).

Panel Meeting Action: Reject

Panel Statement:

The submitter has failed to provide meaningful and specific substantiation for his recommendations. The substantiation he does provide is not based on existing science or engineering principles, but rather anecdotal and personal opinion. None of the substantiation provided relates to premise wiring systems.

The submitter's use of farm and livestock examples are not only anecdotal in nature, they are off the mark. There are few if any livestock farms with customer operated electrical systems in excess of 1000 volts. It is inappropriate to use anecdotal farm examples as substantiation for modifying existing code sections that, for the most part, don't apply to farms. Farms are covered under another article of the NEC

The submitters claim that earth current associated with grounding is hazardous is overstated and leaves out reputable evidence to the contrary. Reference is made to a study, commissioned by the Minnesota PUC which asked the question of whether or not earth currents can be harmful to livestock. The answer was provided in a report prepared by a team of scientists known as the Minnesota Science Advisors. This team worked for four years and spent nearly $1,000,000 reviewing the existing body of relevant research. Among other things their final report states, "We have not found credible scientific evidence to verify the specific claim that currents in the earth or associated electrical parameters such as voltages, magnetic fields and electric fields, are causes of poor health and production in dairy herds." (The Final Report of the Science Advisors can be found at this URL: http://www.puc.state.mn.us/docs/index.htm#electric)
As substantiation, the submitter cites a series of articles that can be found at the following URL: http://www.app.com/strayvoltage/. These articles address concern about contact potentials in a New Jersey neighborhood. As evidenced by the final report of VitaTech Engineering, hired by the National Regulatory Institute to investigate these claims, this was simply a neutral-to-earth voltage concern that led to perceptible touch potentials in and around several residences. The reasons for elevated neutral-to-earth voltage levels at these locations were not mysterious and are well understood. Simple and widely accepted engineering solutions were recommended and implemented. Neutral-to-earth voltage concerns are nothing new, and in no way lend support to allegations of harm from earth currents associated with normal system operation. (The VitaTech Final Report is at the following URL: http://www.state.nj.us/bpu/ click on Energy (left column) and then Stray Voltage - Final Report:).

If, as indicated by the submitter, the California PUC " prohibited using the earth as a return conductor, either partial or total since 1994." there would be no new multi-grounded distribution systems in California. A simple inquiry has determined that this is not the case. The submitter appears to misinterpret rule 33.2 of the State of California Rules for Overhead Electric Line Construction, which is intended to prohibit use of the earth as the normal return conductor. Clearly from the definition of "effectively grounded" at 21.2 A, and the "neutral conductor" rule at 59.4 B-(1), multi-grounding requirements in California are very similar to those in NEC Article 250, Part X as well as the rest of the country. (To access the California overhead rules follow this link and click on 95: http://www.cpuc.ca.gov/static/official+docs/i_go.htm).
The fact that multi-grounded systems above 1000 volts are presently allowed in the NEC and have been there for many years, seems to contradict the submitter's comment that these systems are a recent addition to the NEC.

In general, while there have been instances of step and/or touch potential occurrences over the years, there is certainly no history of unresolved or even difficult to resolve problems. To change or modify grounding requirements in response to unproven theory

~~unresolved or even difficult to resolve problems. To change or modify grounding requirements in response to unproven theory,~~ unknown laws or anecdotal evidence is inappropriate and would result in code requirements that may make 1 kV or greater electrical systems less safe.

The NEC is a minimum standard of electrical safety, it is not a design standard. The design of the electrical system is specific to its purpose. For systems in excess of 1000 volts there are a variety of factors that may dictate system design (e.g. industrial processes, system size, system location, etc.). The existing code for Systems and Circuits of 1 kV and Over appropriately allows for a variety of grounding alternatives including the uni-grounded system the submitter is attempting to mandate as the only method. Acceptance of this proposal would significantly limit system design capabilities and unnecessarily make the affected section of the NEC a design standard, not a safety standard.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-258 Log #2657 NEC-P05 **Final Action: Reject**
(250-184(D))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Revise existing Section 250.184(D) as follows:

(D) Multigrounded ~~Neutral~~ Conductor Systems. Where a multigrounded conductor ~~neutral~~ system is used, the following shall apply:

(1) The multigrounded ~~neutral~~ conductor shall be of sufficient ampacity for the load imposed on the conductor.

(2) For three-phase, four wire systems, the concentric grounded conductor shall be ~~but~~ not less than 33 percent of the ampacity of each ungrounded ~~the~~ phase conductors and shall be connected together at each end of the circuit to form a single conductor. The size of the conductor shall not be required to comply with 310.4.

Exception: In industrial and commercial premises under engineering supervision, it shall be permissible to size the ampacity of each ~~the~~ concentric grounded ~~neutral~~ conductor to not less than 20 percent of the ampacity of the phase conductor.

(3) For single-phase installations, the grounded conductor shall have an ampacity not less than the ungrounded conductor.

(4) ~~(2)~~ The multigrounded ~~neutral~~ conductor shall be grounded at each transformer and at other additional locations by connection to one or more grounding ~~a made or existing~~ electrode(s) in compliance with Part III.

(5) ~~(3)~~ At least one grounding electrode shall be installed and connected to the multigrounded ~~neutral~~ circuit conductor not more than every 400 m (1300 ft).

(6) ~~(4)~~ The maximum distance between any two adjacent electrodes shall not be more than 400 m (1300 ft).

(7) ~~(5)~~ In a multigrounded shielded cable system, the shielding shall be grounded at each cable joint that is exposed to personnel contact.

Substantiation:

The word "neutral" is proposed to be deleted as not all of these systems have a neutral such as a single-phase system.

Other revisions are proposed to refine the requirements to clearly cover both 3-phase and single-phase systems. The 33 percent neutral concentric conductor should clearly relate to the individual conductor and not to the total circular mil area of all three conductors.

Finally, the grounded conductor should be not smaller than the ungrounded conductor for two-wire circuits.

Panel Meeting Action: Reject

Panel Statement:

The panel does not agree with deleting the word "neutral" as there are grounded conductor systems that should not be multigrounded. Item 6 is redundant to item 5. The panel concludes these changes do not add clarity.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-259 Log #3371 NEC-P05 **Final Action: Reject**
(250-185)

Submitter: Donald W. Zipse, Zipse Electrical Engineering, Inc.

Recommendation:

New 250.185 Ground or Earth as a Conductor.
Ground or earth shall not be used as a normal return or circuit conductor. The grounding of the neutral or any other conductor is not permitted as a normal return or circuit conductor. The neutral or any other conductor is permitted to be grounded only for the purposes of stabilization and protection at one location only.

Substantiation:

Adopted and modified from the California rules.
The multigrounded neutral distribution system came into use after the Second World War. One of the first Institute of Electrical and Electronic Engineers' technical papers on multigrounded neutral distribution systems was published in 1946 and it detailed the savings in installation costs - no words about safety as the hazardous and dangerous effects of the multigrounded neutral distribution system were not known or realized until about 1980.
One less wire, one less fuse cutout, one less lightning arrester, less insulators, the list goes on and on of the cost savings.
Do not forget Zipse's Law.
The multigrounding of the neutral results in uncontrolled flow of current across the earth causing harm to animals, cows and pigs and to humans. For the latest human electrical problems resulting from multigrounded neutrals & stray current also know (incorrectly) as stray voltage see www.app.com and scroll down to "stray voltage" where there are over a dozen articles of persons in NJ with problems with multigrounded neutrals.
California Public Service Commission has prohibited using the earth as a return conductor, either partial or total since 1994. There are no reports of stray current from the utilities electrical distribution systems in California. There are no reports of cows being harmed from the lack of stray current in California either since there are no dangerous and hazardous stray currents flowing over the earth uncontrolled.
Multigrounded neutral electrical distribution systems are inherently hazardous and dangerous. Otherwise why would the Attorney General of Michigan be bringing cause in the PUC against a utility that admits that 70 percent of the return current flows uncontrolled over the earth causing fatal harm to cows.
Multiple legal cases are in the courts against the utilities now for causing harm against animals and humans. Wisconsin Supreme court has in front of it such a suit requiring the utility to rewire the distribution system to a farm.
Next group legal suits will probably be against the NEC and the NESC for allowing multigrounded neutral distribution systems, which result in harm to humans since multigrounded neutral distribution systems are in violation of NEC's own Section 90.1(A).
Would the panel members be willing to subject themselves to an unknown amount of electric current flowing through their bodies? Yet, the panel members are decreeing and permitting uncontrolled amount of electric current to flow over the earth harming other humans and animals.
To err is human. Now correct your mistake. It takes a man to...admit being mislead during the last code cycle - not given all the facts.
Donald W. Zipse did not become deeply involved with cows until late November 2001. He spent the first part of 2002 researching the dangerous and hazardous history of multigrounded neutral distribution systems, billing over $10,000.00 on research. He found out where all the American Institute of Electrical Engineers' technical papers are stored and hired a researcher to search for papers containing in the title, "ground" and "grounding" from 1900 to 1940.
Thus, even stronger reasons have been developed since the last code cycle to outlaw multigrounded neutral distribution system in 49 of the 50 United States.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 5-257 (Log #3370).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-261 Log #2855 NEC-P05 **Final Action: Reject**
(280-4(1))

Submitter: Alan Manche, Square D Company

Recommendation:

Add new text to NEC 280.4(1) as follows:
Surge arresters shall not be installed on ungrounded electrical systems less than 1000V.

Substantiation:

This restriction parallels the requirement in 285.3. The technology used in surge arresters under 1000V is similar to that found in TVSS device in Article 285 but they significantly differ from the construction and application of arresters used on systems over 1000V. Surge arresters under 1000V are affected by the same high voltage conditions as TVSS Units that can be derived in ungrounded systems from arcing ground fault conditions and ferroresonance conditions.

Panel Meeting Action: Reject

Panel Statement:

The panel concludes that there are applications for the use of surge arresters on ungrounded systems. The panel notes that the submitter is intending to revise 280.4(A). There is no 280.4(1).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-262 Log #1401 NEC-P05 **Final Action: Accept in Principle**
(280-4(A))

Submitter: Kenneth Brown, Leviton Mfg. Co. Inc.

Recommendation:

Add underlined text and modify format in order to comply with NEC Style Manual as follows:
280.4 Surge Arrester Selection.
(A) Circuits of Less Than 1000 Volts. Surge arrestors installed on a circuit of less than 1000 volts shall comply with all of the following:
(1) The rating of the surge arrester shall be equal to or greater than the maximum continuous phase-to-ground power frequency voltage available at the point of application.
(2) Surge arrestors installed on circuits of less than 1000 volts shall be listed for the purpose.
(3) Surge arrestors shall be marked with a short circuit current rating and shall not be installed at a point on the system where the available fault current is in excess of that rating.

Substantiation:

The revisions above have organized 280.4 to comply with the NEC style manual. Item 3 is the only new material that is being proposed which will require surge arresters under 1000V to be marked with a short circuit current rating. Surge arresters designed for use on circuits of less than 1000 volts are constructed similar to TVSS products as outlined in Article 285. Surge arresters are required to be tested to higher surge levels than TVSS devices, however, the failure mode of arresters under 1000V and TVSS products are similar. Therefore, it is necessary that surge arresters under 1000V have the same short circuit current rating marked on the arrester to ensure a safe application on the electrical system.

Panel Meeting Action: Accept in Principle

Revise 280.4 to read:
280.4 Surge Arrester Selection.
(A) Circuits of Less Than 1000 Volts. Surge arrestors installed on a circuit of less than 1000 volts shall comply with all of the following:
(1) The rating of the surge arrester shall be equal to or greater than the maximum continuous phase-to-ground power frequency voltage available at the point of application.
(2) Surge arrestors installed on circuits of less than 1000 volts shall be listed. ~~for the purpose.~~
(3) Surge arrestors shall be marked with a short circuit current rating and shall not be installed at a point on the system where the available fault current is in excess of that rating.

Panel Statement:

The panel removed the text "for the purpose" to eliminate vague and unenforceable terms, improve clarity, and comply with the NEC Style Manual 3.2.1.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-263 Log #2854 NEC-P05 **Final Action: Accept in Principle**
(280-4(A))

Submitter: Alan Manche, Square D Company

Recommendation:

Add new text to NEC 280.4(1) as follows:
Surge arresters installed on circuits less than 1000V shall be marked with a short circuit current rating and shall not be installed at a point on the system where the available fault current is in excess of that rating.

Substantiation:

The addition of this marking is necessary for surge arresters under 1000V. The technology used in surge arresters under 1000V is similar to that found in TVSS device in Article 285 but they significantly differs from the construction and application of arresters used on systems over 1000V. Surge arresters are often installed on the line side of overcurrent protection, making the identification of the short circuit current rating for the arrester extremely important. Most surge arresters do not currently contain such marking.

Panel Meeting Action: Accept in Principle

Panel Statement:

See the panel action and statement on Proposal 5-262 (Log #1401).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-264 Log #2192 NEC-P05 **Final Action: Reject**
(280-24)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
280.24 Circuits of 1 kV and Over - Interconnections.
The grounding conductor of a surge arrester protecting a transformer that supplies a secondary distribution system shall be interconnected as specified in 280.24(A), (B), or (C).
(A) Metallic Interconnections. A metallic interconnection shall be made to the secondary ~~grounded~~ earth circuit conductor or the secondary circuit grounding conductor provided that, in addition to the direct grounding connecton at the surge arrester, the following occurs:
(1) The ~~grounded~~ earth conductor of the secondary has elsewhere a grounding connection to a continuous metal underground water piping system. However, in urban water-pipe areas where there are at least four waterpipe connections on the neutral and not fewer than four such connections in each mile of neutral, the metallic interconnection shall be permitted to be made to the secondary neutral with omission of the direct grounding connection at the surge arrester.
(2) The ~~grounded~~ earth conductor of the secondary system is a part of a multiground neutral system of which the primary neutral has at least four ground connections in each mile of line in addition to a ground at each service.
(B) Through Spark Gap or Device. Where the surge arrester grounding conductor is not connected as in 280.24(A) or where the secondary is not ~~grounded~~ earthed as in 280.24(A) but is otherwise ~~grounded~~ earthed as in 250.52, an interconnection shall be made through a spark gap or listed device as follows:
(1) For ungrounded or unigrounded primary systems, the spark gap or listed device shall have a 60-Hz breakdown voltage of at least twice the primary circuit voltage but not necessarily more than 10 kV, and there shall be at least one other ground on the ~~grounded~~ earth conductor of the secondary that is not less than 6.0 m (20 ft.) distant from the surge arrester grounding electrode.
(2) For multigrounded neutral primary systems, the spark gap or listed device shall have a 60-Hz breakdown of not more than 3 kV, and there shall be at least one other ground on the ~~grounded~~ earth conductor of the secondary that is not less than 6.0 m (20 ft). distant from the surge arrester grounding electrode.
(C) By Special Permission. An interconnection of the surge arrester ground and the secondary neutral, other than as provided in 280.24(A) or (B), shall be permitted to be made only by special permission.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject
Panel Statement:

The term "earth(ed)" is not defined in Article 100 or used in Article 250 and should not be used as an alternative to the term "grounded." See the panel action and statement on Proposal 5-42 (Log #2191).

Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-265 Log #364 NEC-P05 **Final Action: Accept**
(280-24(A)(2))

Submitter: Jerry V. Smith, Westinghouse Savannah River Company

Recommendation:

Revise text to read as follows:
The grounded conductor of the secondary system is a part of a multigrounded neutral or static system of which the primary neutral or static has at least four ground connections in each mile of line in addition to a ground at each service.

Substantiation:

Our 13.8 kV system is low resistance uni-grounded. The 13.8 kV pole line distribution includes a #2 copper static line. This static line is grounded at virtually every pole easily meeting the four (4) grounds per mile criteria.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-266 Log #2487 NEC-P05 **Final Action: Accept in Principle**
(285-3)

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
285.3 Uses Not Permitted.
A TVSS shall not be used in the following:
(1) Circuits exceeding 600 volts
(2) Ungrounded electrical systems ~~as permitted in 250.21~~
(3) Where the rating of the TVSS is less than the maximum continuous phase-to-ground power frequency voltage available at the point of application
FPN: For further information on TVSSs, see NEMA LS 1-1992, Standard for Low Voltage Surge Suppression Devices. The selection of a properly rated TVSS is based on criteria such as maximum continuous operating voltage, the magnitude and duration of overvoltages at the suppressor location as affected by phase-to-ground faults, system grounding techniques, and switching surges.

Substantiation:

Ungrounded systems are also covered in 250.22. Deleting the specific references will avoid section reference errors. Providing a simple requirement based on the type of system (grounded vs. ungrounded) is sufficient.

Panel Meeting Action: Accept in Principle

Panel Statement:

See the panel action and statement on Proposal 5-267 (Log #3384).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-267 Log #3384 NEC-P05 **Final Action: Accept in Principle in Part**
(285-3)

Submitter: David Shipp, Cutler -Hamer

Recommendation:

Revise text to read as follows:
Article 285 Transient Voltage Surge Suppressors.
285.3 Uses Not Permitted. A TVSS shall not be used in the following:
(1) Circuits over 600V
~~(2) Ungrounded electrical systems as permitted in 250.21~~
Please replace (2) with the following:
(2) TVSSs shall not be permitted on ungrounded systems or High Impedance Grounded systems as permitted in 250.21 EXCEPT under the following conditions:
a) TVSS equipped with only phase-to-phase protection shall be permitted.
b) High Impedance Grounded systems (primarily High Resistance Grounded). TVSSwith phase-to-ground protection shall be rated for full phase-to-phase voltage on its phase-to-ground elements.
c) TVSSs with phase-to-ground protection applied on ungrounded systems shall have their phase-to-ground elements rated for full phase-to-phase voltage AND short circuit protection for the TVSS circuit shall be provided in accordance with the manufacturer's recommendations.
(3) Where the rating of the TVSS - (No change from 2002 NEC)
(4) Corner grounded delta systems shall only be permitted to have TVSSs applied where all internal elements are rated for full line-to-line voltage
FPN No. 2: There are many industrial applications where TVSS type surge protection is needed for Variable Speed Drives and similar loads that are supplied by ungrounded or High Resistance Grounded systems.

Substantiation:

I have been doing power system studies and power quality studies within industry for over 30 years. There are many industrial facilities that have ungrounded 480V systems with many converting to high resistance grounded systems for safety and reliable service continuity. For example, there are 750 paper mills in North America with an average of 50 to 100 substations each. Most, of the petrochemical plants, steel mills and newer power generation plants are converting to high resistance grounded systems with HRG becoming the industry practice for these industries. Variable Speed Drives (VSDs) are a major technology going into these facilities as well. These sensitive VSDs need TVSS protection on their input. A system with many SCR type VSDs fed from the same bus, are subject to phase-to-phase generated impulses caused by other VSDs and applying a TVSS is a reliable and simple solution. This is why I am requesting phase-to-phase rated TVSSs to be acceptable. Note that the type of grounding will not effect the phase-to-phase ratings of a TVSS.

For HRG systems, the maximum sustained voltage to ground cannot exceed phase-to-phase magnitudes, therefore, if the TVSS has its phase-to-ground elements rated phase-to-phase, it should be rated correctly for the application and not be a safety concern.

I have also addressed the ungrounded systems as well. I am suggesting being able to apply the same TVSS ratings as on the HRG system above but with short circuit protection applied. Arcing ground faults on ungrounded systems can escalate to several orders of magnitude greater than rated with respect to ground (a HRG system cannot reach these levels). Therefore, I always fuse or apply a breaker for the TVSS. In this way, the benefits of the TVSS can be realized but the protection takes the TVSS off-line before it can fail catastrophically. In this sense, I view the TVSS similar to a fire pump and its short circuit only requirements. Replacing the TVSS is much more acceptable than the expensive VSDs.

I have also been doing a lot of Power Quality work in the oil fields (West Texas, NM, etc). A typical oil field will be spread out over many square miles, have miles of aerial lines at -- say 12KV. Each well will have its own step down transformer to a VSD or motor starter. Lightning arresters are applied at 12 KV and the only way to protect the VSD is with a properly applied TVSS. Most of these well systems are either ungrounded at 480V or corner grounded delta. There are literally thousands of wells that fit into this category in West Texas, New Mexico, Oklahoma, etc. In these rural systems subject to lots of lightning, TVSSs are regularly being applied. Most do not know that the 2002 NEC made TVSSs on these ungrounded systems illegal. In an effort to protect their VSDs, many manufacturers are applying their own input MOVs (not officially a TVSS) -- which typically are significantly smaller in energy absorption capabilities and, therefore,bg more prone to catastrophic failure. A properly applied external TVSS affords much better protection.

Please note that there are quality TVSSs available in the marketplace for HRG grounded and ungrounded systems and with just phase-to-phase protection.

There also exist TVSS elements internal to equipment attached to ungrounded systems. This statement will result in those elements being exposed to large surges and leading to high failure rate of this equipment.

Panel Meeting Action: Accept in Principle in Part

The panel accepts in principle the revision of (2) and has revised the text to read:

(2) A TVSS shall not be permitted on ungrounded systems, impedance grounded systems, or corner grounded delta systems unless listed specifically for use on these systems. A TVSS device used on an ungrounded system, impedance grounded system, or corner grounded delta system shall be rated for full phase-to-phase voltage.

The recommendations for (2)(b) and 2(c) are not accepted. The proposed additional FPN No. 2 is not accepted.

Panel Statement:

The reference to 250.21 is not necessary. See Proposal 5-266 (Log #2487). A TVSS device for use on an ungrounded system or an impedance grounded system shall not have any connection to ground or a grounded conductor. The panel rejects the fine print note as being superfluous and does not add clarity.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON: I concur with the action of CMP 5 to provide clear language indicating that transient voltage surge suppressors are not permitted ungrounded systems unless it conforms to the new wording incorporated in this section as part of the accepted proposal. This

was needed clarification.

5-268 Log #3383 NEC-P05 **Final Action: Reject**
(285-5)

Submitter: David Shipp, Cutler -Hamer

Recommendation:

Revise text to read as follows:
285.5 Listing. A TVSS shall be a listed device specifically for its application with respect to system grounding as permitted in 250.21 and 285.3(2).
FPN: Equipment that incorporates recognized TVSS must be listed with the TVSS installed.

Substantiation:

I have added to this listing requirement to agree with the new proposed 285.3(2) that I have submitted with this proposed change.
The FPN is to specifically point out that subassemblies inside other pieces of equipment may be recognized but the entire assembly should be listed for the purpose. Many inspectors are opening up equipment and incorrectly requesting listing for the internal TVSS even though 285.1 requires that this section is only applied to premises wiring and not the internal components of listed equipment.

Panel Meeting Action: Reject

Panel Statement:

See the panel action and panel statement on proposal 5-267 (Log #)3384. Rules do not belong in FPNs. This rule is a product standard issue.
The additional wording is not necessary as the listed product must be used in accordance with its listing and labeling in accordance with 110.3(B). The term recognized is not defined in the NEC and is understood by industry to be a component that requires further evaluation as part of the end-use equipment.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-269 Log #2836 NEC-P05 **Final Action: Reject**
(285-11(A))

Submitter: Brian C. Mears, JKELO Electric Company Inc.

Recommendation:

Add new text as follows:
II Installation 285.11 (A) Shall be made visible and accessible at panel covers and/or equipment.

Substantiation:

None provided.

Panel Meeting Action: Reject

Panel Statement:

The proposal is not submitted in a format consistent with the requirements of 4-3.3(d) of the NFPA Regulations Governing Committee Projects in that the submitter has not provided any substantiation.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-270 Log #2193 NEC-P05 **Final Action: Reject**
(285-21)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
285.21 Connection. Where a TVSS is installed, it shall be connected as follows:
(A) Location.
(1) Service Supplied Building or Structure. The transient voltage surge suppressor shall be connected on the load side of a service disconnect overcurrent device required in 230.91.
(2) Feeder Supplied Building or Structure. The transient voltage surge suppressor shall be connected on the load side of the first overcurrent device at the building or structure.
Exception to (1) and (2): Where the TVSS is also listed as a surge arrester, the connection shall be as permitted by Article 280.
(3) Separately Derived System. The TVSS shall be connected on the load side of the first overcurrent device in a separately derived system.
(B) Conductor Size. Line and ground connecting conductors shall not be smaller than 14 AWG copper or 12 AWG aluminum.
(C) Connection Between Conductors. A TVSS shall be permitted to be connected between any two conductors - ungrounded conductor(s), ~~grounded~~ earth conductor, grounding conductor. The ~~grounded~~ earth conductor and the grounding conductor shall be interconnected only by the normal operation of the TVSS during a surge.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The term "earth" is not defined in Article 100 or used in Article 250 and should not be used as an alternative to the term "grounded." See the panel action and statement on Proposal 5-42 (Log #2191).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-271 Log #3382 NEC-P05 **Final Action: Reject**
(285-21(4) (New))

Submitter: David Shipp, Cutler -Hamer

Recommendation:

Add a new Section (4).
(4) Individual Equipment. Where desired to protect individual equipment, the TVSS shall be permitted to be connected on the load side of that equipment's incoming protection or have its own protective device and be located at that individual piece of equipment.

Substantiation:

I have seen many instances in industrial facilities and the oil fields where a transformer feeds just one piece of equipment and the easiest and best location, is to apply it to the incoming terminals of that piece of equipment (for example, a single Variable Speed Drive). This is the reflection point where a transient can momentarily double and cause failure at the reflection point. Placing the surge device at the reflection point is always the best location when protecting individual pieces of equipment. My interpretation of the current rules for location are that you can only apply TVSSs at key system locations - not on individual pieces of equipment - such as Variable Speed Drives. I am proposing adding a new Section (4) here to clear up this ambiguity and also be consistent with my other proposed changes to Article 285.

Panel Meeting Action: Reject

Panel Statement:

The panel concludes that the proposed new item 285.21(A)(4) is not necessary. There is nothing in the present requirements that would prohibit this application.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-272 Log #2533 NEC-P05 **Final Action: Accept**
(285-21(A)(1))

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 4 for information.

Submitter: Alan Manche, Schneider Electric/Square D

Recommendation:

Revise NEC 285.21(A)(1) with the additions (underlined) and deletions (strike through) as shown. The entire text of 285.21(A)(1) is shown for clarity, but only those changes shown underlined or strike through are part of this proposal.

285.21 Connection. Where a TVSS is installed, it shall be connected as follows.

(A) Location.

(1) Service Supplied Building or Structure. The transient voltage surge suppressor shall be connected on the load side of a service disconnect overcurrent device required in 230.91, unless installed in accordance with 230.82(7).

Substantiation:

This proposal continues to support CMP-4s action on Proposal 4-118 to the 1999 NEC that was held by the TCC and Comment 4-71 in the 2002 ROC that was held by the code panel. The TCC appropriately placed this change on hold due to a correlation concern with 285.21(A)(1) which requires the TVSS to be installed on the load side of the service disconnect overcurrent device. The companion proposal submitted to 230.71(A) and 285.21(A) will address the correlation issues.

A companion revision to 230.71(A) is also necessary as supported by CMP-4 in Proposal 4-118 in the 2002 ROP.

(A) General. The service disconnecting means for each service permitted by 230.2, or for each set of service-entrance conductors permitted by 230.40, Exception Nos. 1, 3, 4, or 5, shall consist of not more than six switches or sets of circuit breakers, or a combination of not more than six switches and sets of circuit breakers, mounted in a single enclosure, in a group of separate enclosures, or in or on a switchboard. There shall be no more than six sets of disconnects per service grouped in any one location. For the purpose of this section, disconnecting means used solely for power monitoring equipment, or transient voltage surge suppressors, or the control circuit of the ground-fault protection system or power-operable service disconnecting means, installed as part of the listed equipment, shall not be considered a service disconnecting means.

A companion proposal has been submitted as follows to revise 230.82(7) in order to address the TCC correlation concern.

230.82(7) Ground-fault protection systems or transient voltage surge suppressors, where installed as part of listed equipment, if suitable overcurrent protection and disconnecting means are provided.

Panel Meeting Action: Accept

Panel Statement:

CMP-5 refers this action to CMP-4 for comment.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-273 Log #303 NEC-P05 **Final Action: Reject**
(285-21(A)(4))

Submitter: James E. Koryta, Indiana University / Rep. IAEI

Recommendation:

Add new text as follows:

(4) Other Locations. In locations other than (1), (2), and (3) above the transient voltage surge suppressor shall be connected on the load side of an overcurrent device.

Substantiation:

I.E.E.E. has defined three areas for applying TVSS. They are Category A - Long Branch Circuits; Category B - Major Feeders, Short Branch Circuits and Indoor Service Panels; Category C - Outdoor Overhead Lines and Service Entrance. At present Article 285 is only addressing the Category C location (except for the separately derived system). There are many locations not at service entrances where a TVSS is needed. Consider a panel fed from a dist. panel that is fed from the service entrance equipment.

Panel Meeting Action: Reject

Panel Statement:

Section 250.21(A) items (1), (2), and (3) provide sufficient provisions for all locations of TVSS devices, including those not at the service entrance. It is not clear what is meant by "other locations" in the proposal.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-274 Log #1624 NEC-P05 **Final Action: Reject**
(285-21(A)(4))

Submitter: Kenneth Brown, Leviton Mfg. Co. Inc.

Recommendation:

Add text to read as follows:
285.21(A)(4) TVSS Devices shall not be located integral to switch gear. TVSS devices contain combustible materials that should not be located internal to an enclosure that contains over current protective devices.

Substantiation:

Surge Protective Devices (SPDs) contain combustible material that should not be commingled with over current protection devices. It's impossible to test all the surge or TOV scenarios that an SPD could be exposed to and therefore it is difficult to determine if an SPD will fail safe in all environmental conditions. If an SPD failed, the combustible material could ignite the over urrent protective device. TVSS devices should be placed in a separate enclosure on the downside of the overcurrent protective device.
Note: Supporting Material available for review at NFPA headquarters.

Panel Meeting Action: Reject

Panel Statement:

The panel concludes that this is a product standard issue. Section 285.5 requires TVSS devices to be listed. The appropriate requirements for TVSS devices, and their suitability for use in their intended locations are addressed in the product standard.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

3-5 Log #893 NEC-P03 **Final Action: Reject**
(300-2(A))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text to read as follows:
(A) Voltage. Wiring methods specified in Chapter 3 shall be permitted to be used for 600 volts, nominal, or less where not specifically prohibited elsewhere in this Code ~~limited in some section of Chapter 3~~. They shall be permitted for over 600 volts, nominal, where specifically permitted elsewhere in this Code.

Substantiation:

"Shall be permitted" is in accordance with 3.1.1 of the NEC Style Manual.
There may be other restrictions on the use of these 600 volt wiring methods in other than Chapter 3 Articles.
90.3 states that "Chapters 1, 2, 3, and 4 apply generally; Chapters 5, 6, and 7 apply to special occupancies, special equipment, or other special conditions. These latter chapters supplement or modify the general rules. Chapters 1 through 4 apply except as amended by Chapters 5, 6, and 7 for the particular conditions."

Panel Meeting Action: Reject

Panel Statement:

The recommendation in the proposal is to replace mandatory language with permissive language. The use of permissive language would permit a user of the Code to not use wiring methods specified in Chapter 3 for systems of 600 volts or less. Using permissive language, rather than mandatory language in this instance could have serious safety consequences.
Mandatory language is necessary to require a safe method of installing conductors and connecting equipment. Chapters 5, 6, or 7 may modify the requirements in Chapter 3 as stated in the proposal substantiation and does not provide a reason to change from mandatory to permissive language.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-6 Log #2196 NEC-P03 **Final Action: Reject**
(300-3)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
300.3 Conductors.
(A) Single Conductors. Single conductors specified in Table 310.13 shall only be installed where part of a recognized wiring method of Chapter 3.
(B) Conductors of the Same Circuit. All conductors of the same circuit and, where used, the ~~grounded~~ earth conductor and all equipment grounding conductors and bonding conductors shall be contained within the same raceway, auxiliary gutter, cable tray, cablebus assembly, trench, cable, or cord, unless otherwise permitted in accordance with 300.3(B)(1) through (4).

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

Changing the term "grounded" to "earth" is outside the jurisdiction of Panel 3 and must be acted on by Panel 5 for Article 250 and Panel 1 for definitions.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-7 Log #834 NEC-P03 **Final Action: Accept in Principle**
(300-3(A) Exception (New))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Add:
Exception: Overhead aerial spans in accordance with 225.5 and 225.6 shall be permitted.

Substantiation:

These wiring methods are not covered in Chapter 3. See substantiation for proposal for 310.13.

Panel Meeting Action: Accept in Principle

Change the exception in the proposal to read as follows:
Exception: Individual conductors shall be permitted where installed as separate overhead conductors in accordance with 225.6.

Panel Statement:

Individual conductors used for overhead spans without messenger support are not covered in Chapter 3 so the exception must clearly indicate the installation of individual conductors. Article 396 is a wiring method that already covers messenger supported wiring and Article 398 is a wiring method that covers open wiring on insulators. The substantiation provided for 310.13 proposed change was not available for use in evaluating this proposal. "Aerial span" is not a term recognized by the NEC.
Section 225.5 addresses ampacity of conductors.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-8 Log #502 NEC-P03 **Final Action: Reject**
(300-3(B))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(B) Conductors of the Same Circuit. All conductors of the same circuit and, where used, the grounded conductor and all equipment grounding conductors and bonding conductors shall be contained within the same raceway, auxiliary gutter, cable tray, cablebus assembly, ~~trench~~, cable, or cord, or shall be installed in close proximity in the same trench, unless otherwise permitted in accordance with 300.3(B)(1) through (4).
(1) Paralleled Installations. Conductors shall be permitted to be run in parallel in accordance with the provisions of 310.4. The requirement to run all circuit conductors within the same raceway, auxiliary gutter, cable tray, trench, cable, or cord shall apply separately to each portion of the paralleled installation, and the equipment grounding conductors shall comply with the provisions of 250.122. Parallel runs in cable tray shall comply with the provisions of 392.8(D).
~~Exception: Conductors installed in nonmetallic raceways run underground shall be permitted to be arranged as isolated phase installations. The raceways shall be installed in close proximity, and the conductors shall comply with the provisions of 300.20(B).~~
Exception: Isolated phase, polarity, grounded conductor, and equipment grounding and bonding conductor installations shall be permitted in nonmetallic raceways or cables with a nonmetallic covering or nonmagnetic sheath provided they are installed in close proximity and in accordance with 300.20(B).

Substantiation:

This is a companion proposal to 300.5(I).
The text in both 300.3(B) and 300.5(I) is almost the same and should not be repeated. It is proposed to have 300.3(B) include all the requirements for above ground and underground installations and have 300.5(I) refer back to 300.3(B).
300.3(B) already includes installations in underground trenches. The only additional text from 300.5(I) is the phrase "shall be installed in close proximity".
300.3(B)(1) contains all of the text from 300.5(I), Exception No. 1, with some editorial revision.
300.5(I) Exception No. 2, can replace the current exception in 300.5(B)(1) since it is more comprehensive. The phrase "where conductors are paralleled as permitted in 310.4" was removed from the Exception since it is already included in 300.3(B)(1). The phrase "provided they are installed" was added for editorial purposes and the last phrase was reworded.
These proposed changes will eliminate duplicate text without changing any requirements in the Code and should enhance usability.

Panel Meeting Action: Reject

Panel Statement:

Even though the text in Sections 300.3(B) and 300.5(I) are similar in nature, Section 300.5(I) provides the user of the Code with very clear information where dealing with underground conductors. Referring the user back to 300.3(B) may tend to cause confusion since the proposed exception as written deals with both above ground and below ground paralleled installations.
The existing exceptions in these two sections appear to be very specific and clear as to their meaning and application. Any effort to relocate, shorten, or delete the text would tend to cause confusion and would be counter effective.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-9 Log #1224 NEC-P03 **Final Action: Reject**
(300-3(B))

Submitter: Melanie Roberts, Belco Electric

Recommendation:

Revise text to read as follows:
"All conductors of the same circuit and, where used, the grounded conductor, ~~and~~ all equipment grounding conductors and the bonding conductors shall be contained within the same raceway, auxiliary gutter, cable tray...".

Substantiation:

The elimination of the word "and" in this sentence allows for smoother word flow and easier understanding by the reader. When listing items, "and" should only be used before the last item in the list.

Panel Meeting Action: Reject

Panel Statement:

The "and" in each case were inserted into the sentence to indicate three distinct groups of conductors. The first group is "all conductors"; the second group is the "grounded conductor"; and the third and final group is composed of "equipment grounding conductors and bonding conductors". The groupings must be retained within the text to indicate to the user of the Code that all three-conductor groups must be installed in the same raceways, cable trays, etc.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-10 Log #3211 NEC-P03 **Final Action: Reject**
(300-3(B))

Submitter: Charles M. Trout, Maron Electric Co. Inc.

Recommendation:

Add a new last sentence to read:
"Where cable wiring methods are used, all conductors of the same circuit shall be present in all outlet and switch boxes."

Substantiation:

This requirement will provide for a grounded and an ungrounded conductor to be present in every outlet or switchbox to facilitate in the expansion of the use of electrical wiring as referred to in 90.1(B).

Cable wiring methods are very restrictive when it comes to expanding the use of electricity in a residence. I don't agree with the idea that requiring a hot and a neutral in every outlet box would be considered a design consideration only and not a safety issue. Some of the things that installers do when attempting to install outlets from existing openings that do not have a grounded and an ungrounded conductor present such as using the equipment grounding conductor as a neutral conductor can be extremely hazardous. Permitting the use of conductors "supposedly permanently reidentified" for purposes not intended by the listing can be extremely dangerous to persons attempting to make changes to the use of electricity in a residence.

Panel Meeting Action: Reject

Panel Statement:

The proposal does not provide any substantiation, other than anecdotal, that a safety issue does exist. The substantiation also does not contain any data indicating the number of injuries and fires caused by the lack of extra hot and neutral conductors in outlet and switch boxes.

Requiring all of the conductors of a multiwire branch circuit to be installed in these boxes would result in two hots and a neutral in every box of the circuit. The extra conductors in the boxes may also result in an increase in box size for all of the extra, unused conductors. The added cost and redundancy would and should be a design decision, and does not ensure that an installer would not still violate the Code.

Section 90.1(C) states that the Code is not a design specification and 90.1(B) further states that compliance with the Code will result in an installation that is essentially free from hazard but not necessarily efficient, convenient, or adequate for good service or future expansion of electrical use.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-11 Log #503 NEC-P03 **Final Action: Reject**
(300-3(B)(1))

Submitter: James M. Daly, General Cable

Recommendation:

Revise the last sentence to read:
"Parallel runs in cable tray shall comply with the provision of 392.8(D) and (E).

Substantiation:

Installations of single conductors in cable tray must comply with 392.8(E) as well as 392.8(D). 392.8(E) specifies additional installation conditions for single conductors in tray.

Panel Meeting Action: Reject

Panel Statement:

Section 300(B)(1) applies to parallel conductor installations and the last sentence in this section appropriately refers to Section 392.8(D) since it also deals with single conductors paralleled in a cable tray. Section 392.8(E) provides requirements for single conductors in a cable tray and does not deal with paralleled conductors so the reference should not be added to 300.3(B)(1).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-12 Log #1223 NEC-P03 **Final Action: Reject**
(300-3(B)(3))

Submitter: Melanie Roberts, Belco Electric

Recommendation:

Revise text to read as follows:
Conductors in single conductor-type MI cable with a nonmagnetic sheath shall comply with the provisions of 332.31.

Substantiation:

this change in adding the hyphen and making the "T" in "Type" lowercase is to make the phrasing parallel with the next sentence in the paragraph where "single-conductor-type" is also used.

Panel Meeting Action: Reject

Panel Statement:

Type is capitalized since it is the actual name of the cable, Type MI cable, whereas single-conductor-type is not a formal name for a type of wiring method. A hyphen must also not be added to a formal name of a wiring method since "single" and "conductor" are both adjectives describing Type MI cable.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-11a Log #CP300 NEC-P03 **Final Action: Accept**
(300.3 (B)(3))

Submitter: Code-Making Panel 3

Recommendation:

In the last sentence of the text below, remove the hyphen, add a space, and capitalize "T" in "Type MC cable".
3) Nonferrous Wiring Methods. Conductors in wiring methods with a nonmetallic or other nonmagnetic sheath, where run in different raceways, auxiliary gutters, cable trays, trenches, cables, or cords, shall comply with the provisions of 300.20(B). Conductors in single-conductor Type MI cable with a nonmagnetic sheath shall comply with the provisions of 332.31. Conductors of single-conductor-t Type MC cable with a nonmagnetic sheath shall comply with the provisions of 330.31, 330.116, and 300.20(B).

Substantiation:

Type is capitalized since it is the actual name of the cable, Type MC cable, whereas single-conductor-type is not a formal name for a type of wiring method. A hyphen must not be added to a formal name of a wiring method since "single" and "conductor" are both adjectives describing Type MC cable.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-13 Log #3508 NEC-P03 **Final Action: Reject**
(300-3(C)(1), FPN 2 (New))

Submitter: Leif O. Pihl Minneapolis, MN

Recommendation:

Add a Fine Print Note to 300.3(C)(1) to read as follows:
FPN No. 2: See also Sections 800.12(B), 820.52(A)(2) and 830.58(A)(2) for cable separation requirements.

Substantiation:

Electricians are often unaware of the different clearances that communication, coax and data cables need, both from each other and from AC power conductors. Electricians need this information when laying out the conduit runs. If the separation requirements are noticed late in the installation, last minute changes to conduit runs need to be made. I have noticed, upon more occasions than I can count, that when these clearances are pointed out late in the process that they are usually either ignored or resolved in a haphazard method that does not allow for proper conduit and/or cable support. Adding these cross-references will increase the chance that they will be aware of, and pay attention to these clearances earlier in the installation process.
This proposal, along with the other three (see below), will help safety by reducing these late changes where support distances, securing, and other requirements could then be overlooked or ignored.
Note: Similar proposed changes have been submitted for sections 300.3(C)(1) FPN, 800.12(B)FPN, 820.52(A)(2) FPN and 830.58(2) FPN. These four proposals work together.

Panel Meeting Action: Reject

Panel Statement:

It is not necessary to provide a reference to these sections in Chapter 8 since the installer must be familiar with all the requirements in Articles 800, 810, 820, and 830 before installing these systems, especially in conjunction with power conductors. Also Section 90.3 states that Chapter 8 is not subject to the requirements in Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8. Section 300.3 is not referenced in Chapter 8 at all.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-14 Log #894 NEC-P03 (300-4) **Final Action: Reject**

Submitter: James M. Daly, General Cable

Recommendation:

Revise text to read as follows:

300.4 Protection Against Physical Damage. ~~Where subject to physical damage, conductors shall be adequately protected~~. Conductors, cables, or raceways shall be protected against physical damage.

Substantiation:

Section 300.4 addresses conductors, cables and raceways and this should be included in the primary section.

Throughout the Code, it already specifies that wire and cable cannot be installed where "subjected to physical damage". This section should simply state that conductors, cables, or raceways shall be protected against physical damage.

A few representative sections that prohibit installation of wire and cable or raceways where subject to "physical damage" are listed below:

110.51(C)	334.15(B)	356.12(1)
230.50(B)	336.12(1)	360.12(5)
320.10	340.12(10)	362.12(10)
330.10	348.12(7)	
332.12	350.12(1)	

3.2.1 of the NEC Style Manual states that: "The NEC shall not contain references or requirements that are unenforceable or vague." Table 3.2.1 of the Style Manual lists "adequate" as a possibly unenforceable or vague term.

Panel Meeting Action: Reject

Panel Statement:

The existing text in this section only requires protection where the conductors are subject to physical damage. The proposed change is overly restrictive and would require conductors, cables, or raceways to be protected from physical damage, even if they are not subject to physical damage.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-15 Log #1390 NEC-P03 (300-4) **Final Action: Reject**

Submitter: Samuel Morgan, Protective Electrical Cover Corporation

Recommendation:

I am requesting addition to the National Electrical Code.

Substantiation:

The Protective Electrical Cover was designed to prevent a Router, from cutting or damaging electrical wiring placed into junction boxes, at new built homes and office buildings.

I have provided 14 additional pages of information to indicate the need for my Protective Electrical Cover.

NOTE: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

This proposal does not comply with Section 4.3.3 of the NFPA Rules and Regulations to provide specific text in the recommendation for a change. The supporting information on this product indicates that this is a tool used by drywall installers to ensure a clean cut around switch and outlet boxes. The NEC provides requirements for the maximum gaps around electrical enclosures but does not mandate tools to be used to accomplish this requirement.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-16 Log #3363 NEC-P03 **Final Action: Reject**
(300-4)

Submitter: Mike Weitzel, City of Wenatchee, WA

Recommendation:

Add new text as follows:
Rooftop Installations.
Where raceways not employing threaded couplers and connectors are installed on a rooftop and subject to physical damage, the grounding terminals of all receptacles and all non-current carrying conductive surfaces of fixed electric equipment likely to become energized and subject to personal contact, operating at over 50 volts to ground, shall be grounded by an insulated equipment grounding conductor. The equipment grounding conductor shall be sized in accordance with 250.122, and installed within the raceway with the branch circuit, or feeder conductors.

Substantiation:

Please see photo I have provided (Note: photo not received at NFPA). This is a safety and longevity issue. Rooftop installations of raceways that have been installed according to Code and approved are often later subject to unreasonable physical damage during snow removal or roof replacement. The damaged equipment ground fault path has led to shock, and injuries, and in some cases, electrocution. It is a common occurrence, and in fact the rooftop of the hotel where the NW Section IAEI meeting was held had this problem.

Panel Meeting Action: Reject

Panel Statement:

The intent of Section 300.4 is to provide protection for conductors, where exposed to physical damage. It is, however, outside the jurisdiction of CMP 3 to require the installation of an additional equipment grounding conductor, where the raceway or cable could be subjected to physical damage. CMP 5 has jurisdiction of equipment grounding conductor requirements. CMP 7 and 8 have jurisdiction for cable and raceway protection requirements.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

CASPARRO: Further consideration needs to be given to this proposal. 250.118 recognizes metallic raceways as described in this proposal as an equipment grounding conductor. Raceways installed in these locations are more likely to be damaged due to the elevation in which they are run. There also is a problem with corrosion due to the raceway being exposed to the elements. Either of these conditions can compromise the integrity of the equipment grounding conductor. Although it is not within the scope of Panel 3 to require an additional equipment grounding conductor be installed it is within the scope of panel 3 to prohibit installations of this type just as the Panel prohibits cables from being installed through a bored hole in a framing member that is less than 1 1/4 in. from the nearest surface.

3-17 Log #2976 NEC-P03 **Final Action: Accept in Principle**
(300-4(2)(d))

Submitter: Bob Karrh, Palm Beach County Planning Zoning, Building

Recommendation:

Revise as follows:
(D) Cables and Raceways Parallel to Framing Members. In both exposed and concealed locations, where a cable-or raceway-type wiring method is installed parallel to framing members, such as joists, rafters, ~~or~~ studs, or furring strips, the cable or raceway shall be installed and supported so that the nearest outside surface of the cable or raceway is not less than 32 mm (1 1/4 in.) from the nearest edge of the framing member where nails or screws are likely to penetrate.

Substantiation:

Furring strips are 1 in. deep by 2 in. wide which are nailed to concrete block walls to support sheets of drywall which presecured to the furring strip with dry wall screws. If a cable or raceway-type wiring method is installed parallel to the furring strips, the wiring method is subject to damage from a nail or screw which are likely to penetrate.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Add "and Furring Strips" to the title of this section. Add the phrase "or is installed parallel to furring strips," after the word "studs," in the third line down and "or furring strips" after the words "framing member" in the seventh line down to read as follows:

(D) Cables and Raceways Parallel to Framing Members and Furring Strips. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed parallel to framing members, such as joists, rafters, or studs, or is installed parallel to furring strips, the cable or raceway shall be installed and supported so that the nearest outside surface of the cable or raceway is not less than 32 mm (11/4 in.) from the nearest edge of the framing member or furring strips where nails or screws are likely to penetrate. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by nails or screws by a steel plate, sleeve, or equivalent at least 1.6 mm (1/16 in.) thick.

Panel Statement:

The text was changed to make it clear that while the furring strips are not usually considered to be framing members, protection must still be provided. Cables and raceways are often subjected to physical damage where installed adjacent to furring strips without the maintained spacing required in this section.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-18 Log #217 NEC-P03 **Final Action: Reject**
(300-4(A))

Submitter: Joseph M. Hengstler, Hengstler Electric

Recommendation:

An average three bedroom home uses an average of 18-24 electrical circuits. A larger home can use up to forty-two circuits. When wiring a new home, we run all wiring up over the top of the ceiling rafters. The problem is to install these wires into the electrical panel, we drill out 70-90 percent of the top plate above the panel. The inspectors require us to use 1 1/2 in. x 3 in. steel plates to protect the wiring that is less than 1 1/4 in. It takes 10 of these plates to cover the wooden top plate that is drilled out. Still, the wiring is not protected. A drywall screw, if it hits in between the two plates where they are joined will penetrate the wire.

Substantiation:

I have made a new steel plate that is 3 in. wide x 16 in. long, to eliminate the screw going through and hitting the wire and to save time by only having to install one plate instead of 10. In addition, it would re-support the weakened structure of the top plate. I use four 3 in. galvanized steel screws in each plate.

Panel Meeting Action: Reject

Panel Statement:

This proposal does not comply with Section 4.3.3 of the NFPA Rules and Regulations to provide specific text in the recommendation for a change. Section 300.4 does not prohibit the use of the type of steel plate described by the submitter of the proposal as long as it is at least 1/16th of an inch thick and provides protection for the raceway or cable.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-19 Log #1769 NEC-P03 **Final Action: Reject**
(300-4(A), (I))

Submitter: Robert C. Palko, Jr., Bensalem Twp / Rep. Building & Planning, Electrical

Recommendation:

Add text to read as follows:
Bored Holes. Where there is no objection because of weakening the structure, in both exposed and concealed locations.

Substantiation:

Increase use of experienced wood members and improperly drilling holes in areas not permitted to be drilled.

Panel Meeting Action: Reject

Panel Statement:

Weakening of the building structure by improper drilling is a building and structural code issue and better handled by the structural inspectors then by putting structural requirements, such as are being suggested, in the NEC. The intent of Section 300.4 is to provide requirements for protecting conductors installed in cables and raceways that are inserted into bored holes of the wood framing of a structure.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-21 Log #597 NEC-P03 **Final Action: Reject**
(300-4(A)(1))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Add text to read as follows:
(1) Bored Holes. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed through bored holes in joists, rafters, or wood members, holes shall be bored so that the edge of the hole is not less than 32 mm (1-1/4 in.) from the nearest edge of the wood member. Where this distance cannot be maintained, the distance shall be no less than that required by the applicable building code, and the cable or raceway shall be protected from penetration by screws or nails by a steel plate or bushing, at least 1.6 mm (1/16 in.) thick, and of appropriate length and width installed to cover the area of wiring.

Substantiation:

The NEC requires a minimum of 1 1/4 in. to avoid using a steel plate. Most building codes require a 5/8 in. clearance from the edge for bored holes. In a cooperative spirit, because the building codes feel this is in their preview for structural reasons, we should reference the building codes when an installation is made requiring steel plates.

Panel Meeting Action: Reject

Panel Statement:

The purpose of this section is to provide protection of the cable or raceway and not to provide a minimum clearance of bored holes in structural members of the building for structural strength. While the electrician must be careful about the structural integrity of the building when drilling holes, the reference to the building code for minimum drilling space for holes creates confusion and is unnecessary since the structural requirements of the building are not an issue in this section, only cable and raceway protection.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

EASTER: The panel statement that "structural requirements of the building are not an issue in this section" is not accurate. 300.4(A)(2) references weakening of the building structure, and in addition 300.4(A)(1) states that "holes shall be bored so that the edge of the hole is not less than 32 mm (11/4 in.) from the nearest edge of the wood member." It also states "Where this distance cannot be maintained..."This allows for no minimum distance from the edge.

A widely used national building code was concerned about this issue and a lack of a reference to the building code in the National Electrical Code. Consequently, they accepted a proposal to their electrical code that mandates that the cutting, notching, and boring of wood and steel framing members, structural members and engineered wood products be in accordance with the building code. The NEC should make it clear that these issues are the purview of the applicable building code.

3-20 Log #460 NEC-P03 **Final Action: Accept in Principle**
(300-4(A)(1), 300.4 (A) (2), 300.4 (B) (2), 300.4 (D) and 300.4 (E))

Submitter: Mary Ellen Birli, ERICO Inc.

Recommendation:

Revise text as follows:
"300.4(A)(1) ...protected for penetration by screws or nails by a steel plate or busing at least ~~1.6 mm (1/16 in)~~ 24 GA thick with a minimum hardness of 48 on the 45-N scale, ...
300.4(A)(2) ...is protected against nails or screws by a steel plate at least ~~1.6 mm (1/16 in)~~ 24 GA thick with a minimum hardness of 48 on the 45-N scale, ...
300.4(B)(2) ...a steel sleeve, steel plate, or steel clip not less than ~~1.6 mm (1/16 in)~~ 24 GA in thickness with a minimum hardness of 48 on the 45-N scale, shall be used...
300.4(D) ...protected from penetration by nails or screws by a steel plate, sleeve, or equivalent at least ~~1.6 mm (1/16 in)~~ 24 GA thick with a minimum hardness of 48 on the 45-N scale.
300.4(E) ...shall be protected by ~~1.6 mm (1/16 in)~~ 24 GA thick with a minimum hardness of 48 on the 45-N scale, steel plate, sleeve, or equivalent ...".

Substantiation:

Steel plates of 1/16 in. thickness cause bulging on drywall. Additionally, tests on 1/16 in. thick steel prove that self-tapping screws penetrate this thickness of steel. Therefore, simply specifying a material thickness that is not an effective means of preventing damage to cables, wires, or raceways. The above described material (24 GA with a minimum hardness of 48 on the 45-N scale) prevents screws and nails from penetrating into the cable, wiring, or raceway and maintain the safety of technicians and occupants. For specific test data please refer to the test method and results provided with this proposal.
NOTE: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

See the Panel Action and Statement on Proposal 3-24.

Panel Statement:

The metal plate hardness issue has been addressed by the requirement in Proposal 3-24 that plates of a lesser thickness than 1/16th of an inch must be listed as equal or better than the existing plates.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

AYER: By accepting the word "equal" in the submitter's proposal we are accepting thinner plates that provide the same protection as the 1/16 in. plates that are already allowed in the code. The submitter as well as the panel raised concerns regarding test data that indicates that the 1/16 in. protector plates can be drilled through rather easily. The word "equal" should be removed from the exception to force the manufacturers to produce plates that are better and stronger than what we presently have.

3-22 Log #2633 NEC-P03 **Final Action: Accept in Principle**
(300-4(A)(1), 300.4 (A)(2), 300.4 (B)(2), 300.4(D), and 300.4(E))

Submitter: Robert W. Jensen, dbi-Telecommunications / Rep. BICSI

Recommendation:

Change:
300.4(A)(1) ...protected from penetration by screws or nails by a steel plate or bushing listed as having a minimum thickness of 24 gauge and a minimum hardness of 48 on the 45-N scale,...
300.4(A)(2) ...is protected against nails or screws by a steel plate listed as having a minimum thickness of 24 gauge and a minimum hardness of 48 on the 45-N scale,...
300.4(B)(2) ...a steel sleeve, steel plate, or steel clip listed as having a minimum thickness of 24 gauge and a minimum hardness of 48 on the 45-N scale, shall be used...
300.4(D) ...protected from penetration by nails or screws by a steel plate or sleeve listed as having a minimum thickness of 24 gauge and a minimum hardness of 48 on the 45-N scale.
300.4(E) ...shall be protected by a steel plate or sleeve listed as having a minimum thickness of 24 gauge and a minimum hardness of 48 on the 45-N scale.

Substantiation:

Results of tests performed on 1/16 in. thick steel, which is currently required by the code, show that current code requirements are inadequate. Self-tapping screws, driven with a screw-gun, can penetrate this thickness of steel. Specifying a material thickness alone is not an effective means of preventing damage to cables, wires, or raceways and protecting workers from potential electrical shock. The above-described materials (24 GA with a minimum hardness of 48 on the 45-N scale) prevents screws and nails from penetrating into the cable, wiring, or raceway and protects technicians and occupants.
Note: Supporting material is available for review at NFPA Headquaters.

Panel Meeting Action: Accept in Principle

Panel Statement:

See the Panel Action and Statement on Proposal 3-24. The metal plate hardness issue has been addressed by the requirement in Proposal 3-24 that plates of a lesser thickness than 1/16th of an inch must be listed as equal or better than the existing plates.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

AYER: By accepting the word "equal" in the submitter's proposal we are accepting thinner plates that provide the same protection as the 1/16 in. plates that are already allowed in the code. The submitter as well as the panel raised concerns regarding test data that indicates that the 1/16 in. protector plates can be drilled through rather easily. The word "equal" should be removed from the exception to force the manufacturers to produce plates that are better and stronger than what we presently have.

3-23 Log #2682 NEC-P03 **Final Action: Reject**
(300-4(A)(1) Exception)

Submitter: Phil Simmons, Simmons Electrical Services / Rep. National Armored Cable Manufacturers Assn.

Recommendation:

Revise existing Section 300.4(A)(1) Exception as follows:
Exception: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing, Type AC cable, or Type MC cable.

Substantiation:

Tests by an independent, qualified electrical products testing laboratory have proven that Type AC and MC cables are sufficiently resistant to penetration from nails and screws during construction that additional protection by nail plates is not necessary and should not be required by this section. Please see the copy of the enclosed fact finding report.
The fact finding report proves that Type AC and Type MC are more resistant to penetration by nails and screws used in construction of buildings than rigid nonmetallic conduit is. Since this is true, Type AC and MC cables should be added to the exception to have fair and equal treatment.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

The fact-finding report provided in the submitter's substantiation only proves that there are varying degrees of damage to the cable metal sheaths that were tested. In fact the percentage of metal sheaths that were damaged increased significantly where the cable outer jacket was of aluminum construction. The requirement in the text as presently written provides the additional protection that is needed for this cable type.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-24 Log #578 NEC-P03 **Final Action: Accept in Principle in Part**
(300-4(A)(1) Exception No. 2 (New))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Change "Exception" to "Exception" No. 1.
Add new Exception No. 2.
Exception No. 2: A listed steel sleeve, plate or clip less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail and screw penetration may be used to protect the cable or tubing.

Substantiation:

The minimum thickness of 1.6 mm (1/16 in.) is in place to address field fabricated steel plates and bushings, but is design restrictive for manufactured protector devices. The primary concern is to protect the cable or raceway from nail or screw penetration. As shown in the test report I have provided, a protector device less than 1.6 mm (1/16 in.) thick, that has been heat-treated, can provide equivalent or better resistance to nail or screw penetration.

Conveniently, the scope of UL2239 already includes protector plates, and UL has listed protector plates that are 1.6 mm (1/16 in.) thick. Upon changes to the Code, UL can proceed with adding a test method to list protector devices which are constructed of steel less than 1.6 mm (1/16 in.) thick.

Nail plate testing.

The test was completed to demonstrate the current definition of 300.4 A1, A2, B2, D, and E is design restrictive in its requirements. The current code states that various protection devices of 1.6 mm (1/16 in.) in thickness shall be used to protect the cable or tubing where nails or screws are likely to penetrate.

The test data demonstrates that the requirement of a minimum 1/16 in. protector device can be ineffective in protecting cables from damage where screws or nails might penetrate them. In fact, the test data demonstrates that alternate materials of thinner gauge can provide equivalent or better protection from nails or screws.

Test Method

Material thickness and type was recorded.

The protector device was fastened to wood stud.

One of the screw types was selected and a screw gun set at the maximum torque setting was used to try and drive the screw through the fastener.

Insert Test Results Table Here

(Table shown on page 2697)

Conclusion:

Both the self-tapping and drywall screws were able to penetrate the 1/16 in. thick material.

Neither the self-tapping or drywall screws were able to penetrate the heat-treated spring steel. The tested heat-treated spring steel was less than 1/16 in. thickness; thicknesses of 0.032 and 0.020 were both utilized.

The results indicate that thinner gauge material, which has been heat-treated, can provide equivalent or better protection for cables, wire, or tube/pipe.

Panel Meeting Action: Accept in Principle in Part

Change existing Exception to new Exception No.1 and add the following revised exception as new Exception No. 2 as follows:
Exception No. 2: A listed and marked steel ~~sleeve,~~ plate ~~or clip~~ less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail ~~and~~ or screw penetration ~~may~~ shall be permitted. ~~be used to protect the cable or tubing.~~

Panel Statement:

Sleeves were deleted since raceway sleeves are permitted as a protection means and the clips, mentioned in the proposal, are actually part of a plate assembly and will be covered by the listed plates. The word "marked" was added to ensure that the plates have an identifier located on the plate itself, visible after installation. The reference is to UL Subject 2239. The last phrase was deleted since this is an exception specifically dealing with the plates indicated in the main section. The word "and" was changed to "or" to clarify that either nail or screw penetrations are not permitted.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

AYER: By accepting the word "equal" in the submitter's proposal we are accepting thinner plates that provide the same protection as the 1/16 in. plates that are already allowed in the code. The submitter as well as the panel raised concerns regarding test data that indicates that the 1/16 in. protector plates can be drilled through rather easily. The word "equal" should be removed from the exception to force the manufacturers to produce plates that are better and stronger than what we presently have.

EASTER: Accept the Panel Action, however, the Panel statement is not reflected in the panel action. Make the necessary corrections in the Panel Action with the proper underline and strikethrough as done in similar Proposals 3-27 (Log #570), and 3-28 (Log #572) to accurately reflect the intent of the Panel's action.

3-25 Log #571 NEC-P03 **Final Action: Reject**
(300-4(A)(2))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text as follows:

(2) Notches in Wood. ~~Where there is no objection because of weakening the building structure, i~~ In both exposed and concealed locations, cables or raceways shall be permitted to be laid in notches in wood studs, joists, rafters, or other wood members where the cable or raceway at those points is protected against nails or screws by a steel plate at least 1.6 mm (1/16 in.) thick installed before the building finish is applied. Notching shall be in accordance with the applicable building code. Where a building code does not apply, care shall be taken to assure the building structure is not weakened.

Substantiation:

Building codes have requirements for notching. In a cooperative spirit, because they feel this is in their purview for structural reasons, we should reference the building codes for notching requirements.

Panel Meeting Action: Reject

Panel Statement:

The purpose of this section is to provide protection of the cable or raceway and not to provide a minimum clearance of notches in structural members of the building for structural strength. While the electrician must be careful about the structural integrity of the building when drilling holes or notching structural members, the reference to the building code is unnecessary since the structural requirements of the building are not an issue in this section, only cable and raceway protection.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

EASTER: Since the applicable building code has requirements for notching, the proposed language is more clear than simply stating "where there is no objection because of weakening the building structure". A widely used building code was concerned over notching issues and a lack of a reference to the building code requirements in the National Electrical Code.

Consequently, they accepted a proposal to their electrical code that mandates that the cutting, notching, and boring of wood and steel framing members, structural members and engineered wood products be in accordance with the building code. The NEC should make it clear that these issues are the purview of the applicable building code.

3-26 Log #2683 NEC-P03 **Final Action: Accept in Principle in Part**
(300-4(A)(2) and Exception)

Submitter: Phil Simmons, Simmons Electrical Services / Rep. National Armored Cable Manufacturers Assn.

Recommendation:

Revise existing Section 300.4(A)(2) and the Exception as follows:

(2) Notches in Wood. Where there is no objection because of weakening the building structure, in both exposed and concealed locations, cables or raceways shall be permitted to be laid in notches in wood studs, joists, rafters, or other wood members where the cable or raceway at those points is protected against nails or screws by a steel plate at least 1.6 mm (1/16 in.) thick, and of appropriate length and width installed to cover the area of the wiring, installed before the building finish is applied.

Exception: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, ~~or~~ electrical metallic tubing, Type AC cable, or Type MC cable.

Substantiation:

For the change to 300.4(A)(2), the text proposed is found in 300.4(A)(1). Since the risk of damage for wiring methods that are installed in notches in wood is at least equal to that of wiring in bored holes, the requirement for the steel plate should be equal.

For the proposed change to 300.4(A)(2) Exception, tests by an independent, qualified electrical products testing laboratory have proven that Type AC and MC cables are sufficiently resistant to penetration from nails and screws during construction that additional protection by nail plates is not necessary and should not be required by this section. Please see the copy of the enclosed fact finding report.

The fact finding report proves that Type AC and Type MC are more resistant to penetration by nails and screws than rigid nonmetallic conduit is. Since this is true, Type AC and MC cables should be added to the exception to have fair and equal treatment.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle in Part

Revise existing Section 300.4(A)(2) and the Exception as follows:

(2) Notches in Wood. Where there is no objection because of weakening the building structure, in both exposed and concealed locations, cables or raceways shall be permitted to be laid in notches in wood studs, joists, rafters, or other wood members where the cable or raceway at those points is protected against nails or screws by a steel plate at least 1.6 mm (1/16 in.) thick, and of appropriate length and width installed to cover the area of the wiring. The steel plate shall be installed before the building finish is applied.

Exception: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing.

Panel Statement:

The Panel accepts the submitter's recommendation as it applies to the length and width of the area of the plate but clarified the text. The Panel rejects the revision to the exception to eliminate the requirement for nail plates where types AC and MC cables are used. The fact-finding report provided in the submitter's substantiation only proves that there are varying degrees of damage to the cable metal sheaths that were tested. In fact the percentage of metal sheaths that were damaged increased significantly where the cable outer jacket was of aluminum construction. The requirement in the text as presently written provides the additional protection that is needed for this cable type.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-27 Log #570 NEC-P03 **Final Action: Accept in Principle in Part**
(300-4(A)(2) Exception No. 2 (New))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Change "Exception" to "Exception No. 1".
Add New "Exception No. 2" as follows:
Exception No. 2: A listed steel sleeve, plate or clip less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail and screw penetration may be used to protect the cable or tubing.

Substantiation:

The minimum thickness of 1.6 mm (1/16 in.) is in place to address field fabricated steel plates and bushings, but is design restrictive for manufactured protector devices. The primary concern is to protect the cable or raceway from nail or screw penetration. As shown in the test report I have provided, a protector device less than 1.6 mm (1/16 in.) thick, that has been heat-treated, can provide equivalent or better resistance to nail or screw penetration.

Conveniently, the scope of UL2239 already includes protector plates, and UL has listed protector plates that are 1.6 mm (1/16 in.) thick. Upon changes to the Code, UL can proceed with adding a test method to list protector devices which are constructed of steel less than 1.6 mm (1/16 in.) thick.

Nail plate testing.

The test was completed to demonstrate the current definition of 300.4 A1, A2, B2, D, and E is design restrictive in its requirements. The current code states that various protection devices of 1.6 mm (1/16 in.) in thickness shall be used to protect the cable or tubing where nails or screws are likely to penetrate.

The test data demonstrates that the requirement of a minimum 1/16 in. protector device can be ineffective in protecting cables from damage where screws or nails might penetrate them. In fact, the test data demonstrates that alternate materials of thinner gauge can provide equivalent or better protection from nails or screws.

Test Method

Material thickness and type was recorded.

The protector device was fastened to wood stud.

One of the screw types was selected and a screw gun set at the maximum torque setting was used to try and drive the screw through the fastener.

Insert Test Results Table Here

(Table shown on page 2697)

Conclusion:

Both the self-tapping and drywall screws were able to penetrate the 1/16 in. thick material.

Neither the self-tapping or drywall screws were able to penetrate the heat-treated spring steel. The tested heat-treated spring steel was less than 1/16 in. thickness; thicknesses of 0.032 and 0.020 were both utilized.

The results indicate that thinner gauge material, which has been heat-treated, can provide equivalent or better protection for cables, wire, or tube/pipe.

Panel Meeting Action: Accept in Principle in Part

Change existing Exception to new Exception No.1 and add the following revised exception as new Exception No. 2 as follows:
Exception No. 2: A listed and marked steel ~~sleeve,~~ plate ~~or clip~~ less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail ~~and~~ or screw penetration ~~may~~ shall be permitted. ~~be used to protect the cable or tubing.~~

Panel Statement:

See the Panel Statement for Proposal 3-24.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

AYER: By accepting the word "equal" in the submitter's proposal we are accepting thinner plates that provide the same protection as the 1/16 in. plates that are already allowed in the code. The submitter as well as the panel raised concerns regarding test data that indicates that the 1/16 in. protector plates can be drilled through rather easily. The word "equal" should be removed from the exception to force the manufacturers to produce plates that are better and stronger than what we presently have.

3-28 Log #572 NEC-P03 **Final Action: Accept in Principle in Part**
(300-4(B)(2) Exception (New))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Add new exception as follows:
Exception: A listed steel sleeve, plate or clip less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail and screw penetration may be used to protect the cable or tubing.

Substantiation:

The minimum thickness of 1.6 mm (1/16 in.) is in place to address field fabricated steel plates and bushings, but is design restrictive for manufactured protector devices. The primary concern is to protect the cable or raceway from nail or screw penetration. As shown in the test report I have provided, a protector device less than 1.6 mm (1/16 in.) thick, that has been heat-treated, can provide equivalent or better resistance to nail or screw penetration.

Conveniently, the scope of UL2239 already includes protector plates, and UL has listed protector plates that are 1.6 mm (1/16 in.) thick. Upon changes to the Code, UL can proceed with adding a test method to list protector devices which are constructed of steel less than 1.6 mm (1/16 in.) thick.

Nail plate testing.

The test was completed to demonstrate the current definition of 300.4 A1, A2, B2, D, and E is design restrictive in its requirements. The current code states that various protection devices of 1.6 mm (1/16 in.) in thickness shall be used to protect the cable or tubing where nails or screws are likely to penetrate.

The test data demonstrates that the requirement of a minimum 1/16 in. protector device can be ineffective in protecting cables from damage where screws or nails might penetrate them. In fact, the test data demonstrates that alternate materials of thinner gauge can provide equivalent or better protection from nails or screws.

Test Method

Material thickness and type was recorded.

The protector device was fastened to wood stud.

One of the screw types was selected and a screw gun set at the maximum torque setting was used to try and drive the screw through the fastener.

Insert Test Results Table Here

(Table shown on page 2697)

Conclusion:

Both the self-tapping and drywall screws were able to penetrate the 1/16 in. thick material.

Neither the self-tapping or drywall screws were able to penetrate the heat-treated spring steel. The tested heat-treated spring steel was less than 1/16 in. thickness; thicknesses of 0.032 and 0.020 were both utilized.

The results indicate that thinner gauge material, which has been heat-treated, can provide equivalent or better protection for cables, wire, or tube/pipe.

Panel Meeting Action: Accept in Principle in Part

Add a New Exception to read as follows:

Exception: A listed and marked steel ~~sleeve,~~ plate ~~or clip~~ less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail ~~and~~ or screw penetration ~~may~~ shall be permitted. ~~be used to protect the cable or tubing.~~

Panel Statement:

See the Panel Statement for Proposal 3-24.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

AYER: By accepting the word "equal" in the submitter's proposal we are accepting thinner plates that provide the same protection as the 1/16 in. plates that are already allowed in the code. The submitter as well as the panel raised concerns regarding test data that indicates that the 1/16 in. protector plates can be drilled through rather easily. The word "equal" should be removed from the exception to force the manufacturers to produce plates that are better and stronger than what we presently have.

3-29 Log #963 NEC-P03 **Final Action: Reject**
(300-4(D))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

After "thick" add "The steel shall not cover more than a third the width of the framing member for more than 100 mm (4 in.)."

Substantiation:

The danger to wiring is that carpenters trying to hang drywall or paneling to the framing members will penetrate our cables. Steel plates are intended to protect our cables from this. However, if the steel plates cover the framing members as well, perhaps using them as a handy means of support for our steel, carpenters will try to penetrate the steel in order to reach the framing members, instead of being warned off by the steel. Then, if they miss the framing members, they may get our cables. Where the steel is covering a shallow groove, or a hole drilled too close to the edge, this is not much of a real issue, because we're putting very little in the way of the framing member. It's different where we run cable parallel to the framing member, and cover it, for several feet, or even a foot. Four inches, however, should be pretty safe; carpenters are likely to try at least once to move over rather than bang on through.

Panel Meeting Action: Reject

Panel Statement:

The recommendation, if accepted, may result in cables or raceways installed parallel to framing members not being adequately protected from physical damage. Restricting the steel plate to not longer than 4 inches would mean the entire length of the raceway or cable would not necessarily be protected. The proposal also does not limit this restriction to just steel plates but addresses all steel which could include steel raceways and other sleeves or enclosures installed for protection.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-30 Log #964 NEC-P03 **Final Action: Accept in Principle**
(300-4(D))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add to title:
"...Framing Members or in Walls with Wiring Installed in Spaces Between Masonry and Finishing Materials".

Substantiation:

Walls of materials such as concrete block often are covered with "1-by" furring strips supporting drywall or suchlike. Wiring in that space is considerably less than 32 mm behind the finished surface. Unfortunately, a reasonable reading of this section presently does not demand protection for such wiring. Furring strips are not commonly seen as framing members like studs, joists, or rafters. Amending the title in this way will remove uncertainty about the need to provide equal protection in these walls.

Panel Meeting Action: Accept in Principle

Panel Statement:

The submitter is only addressing wiring installed between masonry and finishing materials but there are other installations where furring strips are used where the potential for damage is equally as great. See the Panel Action and Statement on Proposal 3-17, which would seem to satisfy the submitter's intent.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-31 Log #2736 NEC-P03 (300-4(D)) **Final Action: Reject**

Submitter: Melvin K. Sanders, TECo., Inc.

Recommendation:

Revise the last sentence:
"Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by nail or screws after the final wall finish is installed be a steel plate, sleeve, or equivalent at least 1.6 mm (1/16 in.) thick."

Substantiation:

The present day practice of providing physical protection for wiring methods passing through studs or installed along their face lengthwise has resulted in many proposals and studies to either expand the protection requirements, or to expand the exception reducing the protection requirements.

The 1975 Edition of the NEC introduced the idea of providing all cable wiring methods with a 1/16 in. thick steel plate or bushing for mechanical protection of the installed cables, thereby providing for the protection of conductors required in the first sentence of Section 300-4.

This remained essentially unchanged until the 1984 Edition of the NEC Section 300-4(a)(1) was modified such that wooden members were to provide at least 1-1/4 in. (31.8 mm) of material between the edge of the member and the bored hole for both cables and raceway. If this could not be provided, the 1/16 in. (1.59 mm) thick steel plate would have to be installed, with the exception making clear that certain raceways were to be exempted. This was also carried over into Section 300-4(a)(2). Except for expanding the exceptions to make complete sentences, nothing has changed since then.

However, the 2002 NEC Edition had a proposal to allow a thinner, harder steel plate to be substituted for the 1.6 mm (1/16 in.) thick steel plate. While being turned down, the question arose in my mind as to what protection was being provided by the 1.6 mm (1/16 in.) thick steel plate in use. Inquiry led to the discovery that the listing was directed to its ability to resist corrosion and that it was at least 1/16 in. thick. No claims were made as to its ability to deflect hammered or screw nails.

I had an unscientific hardness test conducted on PVC Schedule 40, steel EMT, IMC, both aluminum and steel RMC, listed metal protector plates, and sides that had been removed form gangable steel device boxes (since steel device boxes are approximately 1/16 in. thick, and had historically been used for that purpose).

The PVC hardness test was inconclusive and therefore no number was assigned. The other steel products had similar hardness numbers, all within the metal sheet gage (MSG) range. So called "mile" steel is actually a misnomer as it is harder than MSG, and both are less hard than steel used for permanent forming material, as typically used for guards or shields, or anywhere the formed shape must be maintained.

Screw nails do not typically have a hardness rating as such, but they are expected to penetrate 20 MSG, manufacturing tolerances allow it to penetrate 18 MSG, and while not expected go through 16 MSG it can do so. Only if 14 MSG or 12 MSG is used can penetration be expected to be totally avoided.

Numerous studies have been conducted over the last several Code cycles and all have shown that while the cable outer mechanical jacket may be penetrated, the enclosed insulated conductors have successfully moved aside and remained undamaged.

Therefore, I have concluded that the only reasonable purpose behind the steel protectors is to deflect the smaller nails, brads and screws used to hang wall plaques, pictures and ornaments after the final wall finish is installed and the wiring method routing can no longer be discerned.

While the wall finish is being installed, it has to be the responsibility of the other crafts to maintain the necessary clearances in order to maintain cable integrity.

Panel Meeting Action: Reject

Panel Statement:

The original and maintained reason for protection is for both during construction and after the final wall finish is applied as stated in the substantiation, since in both cases the raceway or cable could be damaged, thus damaging enclosed conductors. Other trades and crafts will not often recognize the hazard to our wiring methods and inadvertently damage our raceways and cable so protection must also be maintained during construction. The proposed text would not require protection during construction with a drastic reduction in safety as a result.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-32 Log #182 NEC-P03 **Final Action: Reject**
(300-4(D) Exception No. 3 (New))

Submitter: Lloyd L. Gadbois, Village of Bradley / Rep. IBEW Local 176

Recommendation:

Add new text as follows:
300.4(D) Cables and Raceways Parallel to Framing Members.
Exception No. 3: Where installed parallel to studs and within the space between the studs, it shall not be necessary to support or confine the cable to the surface of the stud at intervals less than 2.44 m (8 ft). Staples may be used to control a wayward cable to prevent its being captured between the stud face and any finished wall covering.

Substantiation:

To "securely fasten" NM cable to the inner surface of a stud is the same as holding it in a vise. It is not possible for any nail or screw to penetrate a cable freely hung, unsecured, in a space between two studs. The weight of eight or even ten feet of NM cable as large as Number 10 is not enough to require additional support.

Panel Meeting Action: Reject

Panel Statement:

The purpose of support of the cable is ensure that the cable is not inadvertently damaged during construction, such as stated in the proposal, where an unsupported cable is "captured" between the wall covering and the stud behind the wall covering. In recent years, the electrical industry has developed many different types of cable supports that will provide the proper offsetting of the cables while still providing the limited flexibility in the cable to help prevent damage to the conductors in the cable.

CMP 7 has jurisdiction of the supporting, securing, and special protection issues of cable methods, while CMP 3 has jurisdiction over general protection methods of cables and raceways. Acceptance of this proposed exception would not enhance safety and very well may reduce safety.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

3-33 Log #573 NEC-P03 **Final Action: Accept in Principle in Part**
(300-4(D) Exception No. 3 (New))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Add new exception as follows:
Exception No. 3: A listed steel plate, sleeve or equivalent less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail and screw penetration may be used to protect the cable or raceway.

Substantiation:

The minimum thickness of 1.6 mm (1/16 in.) is in place to address field fabricated steel plates and bushings, but is design restrictive for manufactured protector devices. The primary concern is to protect the cable or raceway from nail or screw penetration. As shown in the test report I have provided, a protector device less than 1.6 mm (1/16 in.) thick, that has been heat-treated, can provide equivalent or better resistance to nail or screw penetration.

Conveniently, the scope of UL2239 already includes protector plates, and UL has listed protector plates that are 1.6 mm (1/16 in.) thick. Upon changes to the Code, UL can proceed with adding a test method to list protector devices which are constructed of steel less than 1.6 mm (1/16 in.) thick.

Nail plate testing.

The test was completed to demonstrate the current definition of 300.4 A1, A2, B2, D, and E is design restrictive in its requirements. The current code states that various protection devices of 1.6 mm (1/16 in.) in thickness shall be used to protect the cable or tubing where nails or screws are likely to penetrate.

The test data demonstrates that the requirement of a minimum 1/16 in. protector device can be ineffective in protecting cables from damage where screws or nails might penetrate them. In fact, the test data demonstrates that alternate materials of thinner gauge can provide equivalent or better protection from nails or screws.

Test Method

Material thickness and type was recorded.

The protector device was fastened to wood stud.

One of the screw types was selected and a screw gun set at the maximum torque setting was used to try and drive the screw through the fastener.

Insert Test Results Table Here

(Table shown on page 2698)

Conclusion:

Both the self-tapping and drywall screws were able to penetrate the 1/16 in. thick material.

Neither the self-tapping or drywall screws were able to penetrate the heat-treated spring steel. The tested heat-treated spring steel was less than 1/16 in. thickness; thicknesses of 0.032 and 0.020 were both utilized.

The results indicate that thinner gauge material, which has been heat-treated, can provide equivalent or better protection for cables, wire, or tube/pipe.

Panel Meeting Action: Accept in Principle in Part

Add new Exception No. 3 as follows:

Exception No. 3: A listed and marked steel ~~sleeve,~~ plate ~~or clip~~ less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail ~~and~~ or screw penetration ~~may~~ shall be permitted. ~~be used to protect the cable or tubing.~~

Panel Statement:

See the Panel Statement on Proposal 3-24.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

AYER: By accepting the word "equal" in the submitter's proposal we are accepting thinner plates that provide the same protection as the 1/16 in. plates that are already allowed in the code. The submitter as well as the panel raised concerns regarding test data that indicates that the 1/16 in. protector plates can be drilled through rather easily. The word "equal" should be removed from the exception to force the manufacturers to produce plates that are better and stronger than what we presently have.

3-34 Log #574 NEC-P03 **Final Action: Accept in Principle in Part**
(300-4(E) Exception No. 2 (New))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Change "Exception" to "Exception" No. 1.
Add New Exception No. 2 as follows:
Exception No. 2: A listed steel plate, sleeve or equivalent less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail and screw penetration may be used to protect the cable or raceway.

Substantiation:

The minimum thickness of 1.6 mm (1/16 in.) is in place to address field fabricated steel plates and bushings, but is design restrictive for manufactured protector devices. The primary concern is to protect the cable or raceway from nail or screw penetration. As shown in the test report I have provided, a protector device less than 1.6 mm (1/16 in.) thick, that has been heat-treated, can provide equivalent or better resistance to nail or screw penetration.

Conveniently, the scope of UL2239 already includes protector plates, and UL has listed protector plates that are 1.6 mm (1/16 in.) thick. Upon changes to the Code, UL can proceed with adding a test method to list protector devices which are constructed of steel less than 1.6 mm (1/16 in.) thick.

Nail plate testing.

The test was completed to demonstrate the current definition of 300.4 A1, A2, B2, D, and E is design restrictive in its requirements. The current code states that various protection devices of 1.6 mm (1/16 in.) in thickness shall be used to protect the cable or tubing where nails or screws are likely to penetrate.

The test data demonstrates that the requirement of a minimum 1/16 in. protector device can be ineffective in protecting cables from damage where screws or nails might penetrate them. In fact, the test data demonstrates that alternate materials of thinner gauge can provide equivalent or better protection from nails or screws.

Test Method

Material thickness and type was recorded.

The protector device was fastened to wood stud.

One of the screw types was selected and a screw gun set at the maximum torque setting was used to try and drive the screw through the fastener.

Insert Test Results Table Here

(Table shown on page 2699)

Conclusion:

Both the self-tapping and drywall screws were able to penetrate the 1/16 in. thick material.

Neither the self-tapping or drywall screws were able to penetrate the heat-treated spring steel. The tested heat-treated spring steel was less than 1/16 in. thickness; thicknesses of 0.032 and 0.020 were both utilized.

The results indicate that thinner gauge material, which has been heat-treated, can provide equivalent or better protection for cables, wire, or tube/pipe.

Panel Meeting Action: Accept in Principle in Part

Change existing Exception to new Exception No.1 and add the following revised exception as new Exception No. 2 as follows:
Exception No. 2: A listed and marked steel ~~sleeve,~~ plate ~~or clip~~ less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail ~~and~~ or screw penetration ~~may~~ shall be permitted. ~~be used to protect the cable or tubing.~~

Panel Statement:

See Panel Statement on Proposal 3-24.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

AYER: By accepting the word "equal" in the submitter's proposal we are accepting thinner plates that provide the same protection as the 1/16 in. plates that are already allowed in the code. The submitter as well as the panel raised concerns regarding test data that indicates that the 1/16 in. protector plates can be drilled through rather easily. The word "equal" should be removed from the exception to force the manufacturers to produce plates that are better and stronger than what we presently have.

3-35 Log #141 NEC-P03 **Final Action: Accept in Principle in Part**
(300-5)

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 17 for comment.

Submitter: David Hoyt, Seminole County

Recommendation:

Add new text to read as follows:
Underground wiring to a listed low voltage underwater luminare 15 volts or less shall be a minimum of 12 in. below grade.

Substantiation:

The NEC does not specify a burial depth for a 15 volt or less luminare for a pool. Due to this we have conduits just under sod and damage has occurred. A minimum depth of 12 in. would protect conduit from damage.

Panel Meeting Action: Accept in Principle in Part

In the title of Column 5 of Table 300.5, add "for Submersible Luminaires Operating at 15 Volts or Less and" after "Circuit" to read as follows

Column 5

Circuits for Submersible Luminaires Operating at 15 Volts or Less and for Control of Irrigation and Landscape Lighting Limited to Not More Than 30 Volts and Installed with Type UF or in Other Identified Cable or Raceway.

Panel Statement:

The burial depths for raceways and cables are located in Table 300.5. Note 4 of Table 300.5 covers where one of the wiring methods in Column 1 (dealing with direct burial conductors or cables), Column 2 (dealing with rigid metal or IMC), or Column 3 (dealing with nonmetallic raceways listed for direct burial or other approved raceways) is used with one of the circuit types in Column 4 (dealing with residential branch circuits rated 120 volts or less with GFCI protection and maximum overcurrent protection of 20 amps) or Column 5 (dealing with circuits for control of irrigation and landscape lighting). Neither Column 4 nor 5 deals with submersible luminaires and the circuits supplying these fixtures.

This text has been more appropriately added to the title of Column 5 since the Table is where burial depths are located. The submitter has not provided any substantiation to warrant a burial depth of 12 inches for all conduits containing these circuits, so the burial depth of 12 inches is rejected. Rigid metal conduit and IMC could be installed at a burial depth of 6 inches without concern of physical damage to the conductors.

This action should be referred by the TCC to CMP 17 for informational purposes and possible comment by the Panel at the Comment Stage.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-36 Log #250 NEC-P03 **Final Action: Reject**
(300-5)

Submitter: Richard L. Waters, Intermountain Electric

Recommendation:

I think that conduit boring needs to be addressed under Table 300.5 and also added to the appropriate conduit section to address listed types and use for different bore conduit as well as solutions for installing service laterals to meet existing code.

Substantiation:

I have encountered numerous problems with different inspection jurisdictions. Some jurisdictions require a disconnect ahead of any bored conduit with house service laterals, due to the unavailability to install warning ribbon 12 in. above the bore, which changes the service laterals to protected feeders. Please advise me of proposed solutions for this problem.

Panel Meeting Action: Reject

Panel Statement:

The proposal does not comply with Section 4.3.3 of the NFPA Rules and Regulations to provide specific text in the recommendation for a change. Section 300.5(K) does deal specifically with directional boring by requiring cables and raceways installed by boring equipment to be approved for the purpose (of installation by boring equipment). The burial depths of raceways and cables are the same whether using a trencher, a shovel, a backhoe, or a boring machine. Some vibrating trenchers have the ability to insert a ribbon directly 12 inches above direct buried service conductors.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-37 Log #1465 NEC-P03 **Final Action: Reject**
(300-5)

Submitter: Jamie McNamara Hastings, MN

Recommendation:

I underlined added text and put a strike through deleted text.
"300.5 Underground Installations..."
(D) Protection from Damage. Direct-buried conductors and cables shall be protected from damage in accordance with (1) through (4) ~~(5)~~.
(1) Emerging from Grade. Direct-buried conductors and enclosures emerging from grade shall be protected by enclosures or raceways extending from the minimum cover distance required by 300.5(A) below grade to a point at least 2.5 m (8 ft) above finished grade. In no case shall the protection be required to exceed 450 mm (18 in.) below finished grade.
(2) Conductors Entering Buildings. Conductors entering a building shall be protected to the point of entrance.
~~(3) Service Conductors. Underground service conductors that are not encased in concrete and that are buried 450 mm (18 in.) or more below grade shall have their location identified by a warning ribbon that is placed in the trench at least 300 mm (12 in.) above the underground installation.~~
(3) ~~(4)~~ Enclosure or Raceway Damage. Where the enclosure or raceway is subject to physical damage, the conductors shall be installed in rigid metal conduit, intermediate metal conduit, Schedule 80 rigid nonmetallic conduit, or equivalent.
(4) ~~(5)~~ Listing. Cables and insulated conductors installed in enclosures or raceways in underground installations shall be listed for use in wet locations.
"(E) …"
(G) Service Conductors. Underground service conductors that are not encased in concrete or in metal conduit and that are buried 450 mm (18 in.) or more below grade shall have their location identified by a warning ribbon that is placed in the trench at least 300 mm (12 in.) above the underground installation.

Substantiation:

To require nonmetallic conduits (PVC) containing service conductors to have an identification ribbon. When excavating around nonmetallic conduits, the conduits and the conductors inside are often damaged and striped, exposing the excavator to hazards, before being recognized as conduit and conductors.

Panel Meeting Action: Reject

Panel Statement:

The first method of protection of service conductors should be prevention and this can often be accomplished by first finding the location of the conductors using a locator tool. Once that is accomplished then the backhoe or trencher operator has an idea that there are service conductors in the location of the dig. Direct buried service conductors are much more easily damaged, even when the operator is scratching the surface of the trench to locate the conductors, than when the conductors are installed in a raceway. The purpose of the ribbon is to provide a marker so that the operator can then know the direct buried conductors are located six inches below that level.

The ribbon would not be of any use if the operator of the backhoe or trencher just started digging in the area without knowing if anything at all is buried in that area, even if the conductors were enclosed in a steel or PVC raceway.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

CASPARRO: This proposal should be given further consideration. 300.5(D) applies only to direct buried conductors and does not cover installations in raceways. A back hoe digging a trench can cause significant damage to underground raceways and the installed conductors potentially exposing workers to a hazardous condition. I disagree with the panel statement that determining the location of buried raceways and conductors should be solely dependent on the accuracy of a locator tool. The addition of a warning ribbon will provide a physical means of early detection that could prevent serious injury to persons performing excavation work and should be required.

3-38 Log #2198 NEC-P03 **Final Action: Reject**
(300-5)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
300.5 Underground Installations.
(A) Minimum Cover Requirements. Direct-buried cable or conduit or other raceways shall be installed to meet the minimum cover requirements of Table 300.5.
(B) Grounding. All underground installations shall be earthed, grounded and bonded in accordance with Article 250.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

Changing the term "grounded" to "earth" is outside the jurisdiction of Panel 3 and must be acted on by Panel 5 for Article 250 and Panel 1 for definitions.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-39 Log #2296 NEC-P03 **Final Action: Reject**
(Table 300-5)

Submitter: Brian M. Bowers, Power Plus Inc.

Recommendation:

Location of wiring method or circuit. Add new classification under given category. Under a building, subject to vehicular traffic. (forklifts, trucks, etc.). Minimum burial depth 18 in. all categories.

Substantiation:

Buildings subject to vehicular traffic. I have had to repair broken conduits under building slab, caused from traffic.

Panel Meeting Action: Reject

Panel Statement:

There was no substantiation given in the proposal to warrant a new column in Table 300.5. If the first floor of the building stated in the substantiation had a floating slab then obviously excessive vehicular weight could cause some problems with raceways not buried deeply enough below the slab. A more complete study of the installation, the structural details, and a detailed stress evaluation of the damaged raceways would provide additional information and substantiation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-38a Log #3340 NEC-P03 **Final Action: Reject**
(300-5)

Submitter: Brian Walker, City Electric

Recommendation:

Proposal is all underground conductors to be run in pipe when installation is outdoors.

Substantiation:

From personal experience, I have been on many jobs where I had to fix UF wire that has been broken from rocks laying on wire and shorting or breaking conductors.

Panel Meeting Action: Reject

Panel Statement:

There is no technical substantiation for this requirement. The current code text in Section 300.5 (F) adequately covers this. This proposal violates section 4-3.3 in the NFPA Rules and Regulations requiring the proposal to supply specific text in the recommendation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-40 Log #1231 NEC-P03 (300-5(B)) **Final Action: Accept in Principle**

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
(B) Grounding. All underground installations shall be grounded and bonded ~~in accordance with Article 250~~.

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ''grounded in accordance with Article 250'' unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept in Principle

Panel Statement:

See the Panel Action on Proposal 3-41 that would seem to address the submitter's concerns. The text "in accordance with Article 250" in Section 300.5(B) was deleted since Article 250 already applies generally and the remainder of the text in this section was deleted since there are some applications covered by Article 250 that are not required to be bonded and grounded.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-41 Log #1648 NEC-P03 (300-5(B)) **Final Action: Accept**

Submitter: Richard P. Owen, City of St. Paul, Minnesota

Recommendation:

Delete text as follows:
~~(B) Grounding. All underground installations shall be grounded and bonded in accordance with Article 250.~~

Substantiation:

This proposal is to address a recommendation of the Usability Task group. The language is unnecessary since Article 250 already applies generally to all installations.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-39a Log #CP302 NEC-P03 (300.5(B)) **Final Action: Accept**

Submitter: Code-Making Panel 3

Recommendation:

Move the text from 300.5(D)(5) to the new location in 300.5(B) and change the text in 300.5(D) to read "...in accordance with (1) through (4)."
(B) Listing. Cables and insulated conductors installed in enclosures or raceways in underground installations shall be listed for use in wet locations.

Substantiation:

Present location of this subsection would only apply to direct buried conductors and cables. The requirement for cables and conductors installed in enclosures and raceways in an underground installation be listed for wet locations should apply to all underground installations. This new location applies to all underground installations.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-42 Log #3226 NEC-P03 **Final Action: Reject**
(300-5(C))

Submitter: Larry G. Watkins, Alcan Cable

Recommendation:

Add the following test to 300.5(C):
Listed direct burial armored cables utilizing conductors or cables that are suitable for direct burial installations by themselves shall not be required to be installed in a raceway under buildings as identified in Column 1 of Table 300.5.

Substantiation:

Requirements for armored cables (Type MC) utilizing Type USE conductors were removed from UL 1569 with an understanding that they are more appropriate in UL 854, Multi-listed Type (USE or RHH or RHW) conductors and cables are suitable for direct burial installations by themselves per NEC and their product standards. Additional mechanical protection is provided by metallic armor and a moisture resistant jacket (where required) to these assemblies. Such armored cable constructions are an "engineered construction" for service applications and as such shall not be required to be installed in raceways as stated in Column 1 of Table 300.5. Further, RHH and RHW ratings of conductors in these assemblies makes them suitable to come through the building and terminate inside. Recognition of such constructions in the NEC will insure proper listing of such products in accordance with UL 854.

Panel Meeting Action: Reject

Panel Statement:

The submitter does not provide adequate technical substantiation to support this change. Reference is made to the "additional mechanical protection" offered by this cable type with out any documentation to prove that it can provide an acceptable level of protection for the type of installation described.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-43 Log #2061 NEC-P03 **Final Action: Reject**
(300-5(D)(5))

Submitter: J. Patrick Roberts, Round Rock Independent School District

Recommendation:

Add text to read as follows:
All wiring in underground metallic raceways for exterior area pole lighting systems shall be stranded.

Substantiation:

When contractors use solid wire on our pole lights, we encounter many problems, after the warranty period has expired, because of damage to conductors caused during construction.

Panel Meeting Action: Reject

Panel Statement:

There was no substantiation given that warrants the requirement of stranded conductors versus solid. 300.5(D) only addresses direct buried conductors, not those enclosed in a raceway as shown in the proposal recommendation. Adding underground metallic raceways to this section would not be appropriate.

Assuming the underground metal raceways were properly installed and there was little or no earth movement to cause damage to the raceway, either stranded or solid conductors would be acceptable.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-44 Log #2488 NEC-P03 **Final Action: Reject**
(300-5(D)(3))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
(3) ~~Service~~ Underground Conductors.
A warning ribbon shall be placed at least 300 mm (12 in.) above conductors and cables that meet all of the following conditions:
(1) Are directly buried 450 mm (18 in.) or more below grade,
(2) Are not encased in concrete.

Substantiation:

Branch circuits and feeders that are accidentally excavated also pose a hazard. It is unlikely that an effective fault current path will when the conductors are severed. It is quite possible that one or more of the circuit conductors are contacted without contacting the equipment grounding conductor or bonding conductor.

Panel Meeting Action: Reject

Panel Statement:

Even though branch circuits and feeders may be accidentally excavated, overcurrent protection devices protect them. Service conductors are not protected by overcurrent protection devices and constitute a much greater hazard. At the present time, the use of ribbon is only required for underground service conductors and to expand the use of this ribbon to all underground installations would tend to desensitize the affect of the ribbon. Often, people tend to disregard safety items when exposed too often to those items. Overuse of this safety item will have a serious negative effective of their usefulness.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

CASPARRO: This proposal should be accepted. I do not agree with the panel's assumption that the value of fault current will always be limited to a safe level on the load side of an overcurrent protective device. There are many factors that can increase the time duration in which an overcurrent device will respond to a fault permitting extremely high levels of current to flow until the overcurrent device opens. I also do not agree that expanding the use of ribbon to all underground installations would tend to desensitize the affect of the ribbon. Persons performing excavation work who encounter a ribbon warning them of buried conductors will not ignore the warning. Instead it will provide a physical means of early detection for the worker that could prevent serious injury.

3-45 Log #3110 NEC-P03 **Final Action: Reject**
(300-5(D)(3))

Submitter: Thomas J. Garvey, State of Wisconsin

Recommendation:

Revise the first sentence to read: ~~Service~~ Underground Conductors. Underground ~~service~~ conductors that are not encased in concrete and that are...". (Remainder of text to remain the same.) Add an Exception to read: "Conductors installed in conduit by means of direction boring equipment."

Substantiation:

The ribbon provides early warning for all types of buried conductors. Feeder and branch circuits are not the responsibility of the utility and often not located prior to digging. The ribbon is impracticable to install with directional boring equipment. It can be plowed in at the same time as the conductors.

Panel Meeting Action: Reject

Panel Statement:

See the Panel Statement on Proposal 3-44.
The proposed exception, as recommended in the proposal is unnecessary since this section only requires the ribbon be placed in the trench and boring machines do not create a trench.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-46 Log #575 NEC-P03 **Final Action: Reject**
(300-5(D)(5))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Add new text as follows:
(5) Listing.
(a) Wet Locations. Cables and insulated conductors installed in enclosures or raceways in underground installations shall be listed for use in wet locations.
(b) Raceways and Sleeves.
(1) Raceways used with direct burial cable or conductors shall be installed as a complete run in accordance with 300.18(A) and shall be listed.
(2) A sleeve of metric designator 155 (trade size 6) or less that is used with direct burial cables or conductors shall be made from a listed raceway.

Substantiation:

This proposal is to clarify that raceways are required to be listed when within the sizes available whether it is used as a complete system or as a sleeve. This proposal also clarifies that cables and conductors that are listed for direct burial and are being installed in a raceway, underground, that the raceway is still required to be listed. Installers are sometimes using any piece of pipe available for a sleeve. This leads to conductor insulation damage, and is contrary to the purpose of physical protection. It is also important to have all raceways installed as a complete system prior to wire pulling to prevent conductor damage.

Panel Meeting Action: Reject

Panel Statement:

Section 300.18(a) already requires raceways to be installed complete between outlet, junction, or splicing points prior to the installation of conductors and other articles in Chapter 3 require the raceways to be listed.

If the raceway is not complete between these points, it is considered to be a sleeve being used to enclose conductors listed for direct burial. Since direct burial conductors do not require a raceway of any kind, the sleeve is most often used to permit insertion and extraction of the direct burial cables under or around obstructions at a later time. Sleeves are often buried under concrete driveways and in trenches so that direct burial conductors or even other raceways or cables can be installed at a later time. Many times, a concrete duct or a PVC water pipe is used as a sleeve. These sleeves should not be required to be from listed raceways since the direct burial conductors are already listed for direct burial. Since there may be other underground utilities, such as water pipes, sprinkler wiring, sprinkler pipes, low voltage lighting cables, installed in the same sleeve, this would then be a possible violation of 300.8. This would require a separate raceway sleeve just for the electrical system.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

EASTER: Proposal 3-46 should be accepted. The proposal adds clarity concerning the use of listed raceways regardless of whether cables or conductors are suitable for direct burial and that sleeves used to enclose cables and wires should be from listed raceways to prevent damage.

There are no requirements on sleeves made from non listed raceways, water pipes, concrete ducts, etc., including what they should be made of and the integrity of the interior to prevent damage when conductors and cables are being pulled or pushed. The likelihood of damage in a listed sleeve would eliminate this concern because of requirements for crush and impact resistance and for the interior of the raceways be free of any burrs or protrusions that could damage cables or conductors.

3-47 Log #2489 NEC-P03 **Final Action: Accept in Part**
(300-5(G))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
(G) Raceway Seals. Conduits or raceways through which moisture may contact ~~energized~~ live parts operating at 50 volts or more shall be sealed or plugged at either or both ends.
FPN: Presence of hazardous gases or vapors may also necessitate sealing or underground conduits or raceways entering buildings.

Substantiation:

A voltage level should be provided. The specific level matches that in 110.27, applicable to guarding requirements. If another voltage level is more appropriate it should be inserted. The term energized was deleted because it is already included in the definition of live parts.

Panel Meeting Action: Accept in Part

Accept the deletion of the word "energized" and reject the remainder of the proposal.

Panel Statement:

While the submitter is correct on the definition of live parts, there was no substantiation submitted to justify the addition of a voltage level to this section. Condensation (water) and corrosion can adversely affect systems of any voltage so conduits or raceways should be sealed or plugged to prevent that occurrence regardless of the voltage.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-48 Log #504 NEC-P03 (300-5(I)) **Final Action: Reject**

Submitter: James M. Daly, General Cable

Recommendation:

Revise 300.5(I) as follows:

(I) Conductors of the Same Circuit. Conductors of the same circuit shall be installed in accordance with 300.3(B). ~~All conductors of the same circuit and, where used, the grounded conductor and all equipment grounding conductors shall be installed in the same raceway or cable or shall be installed in close proximity in the same trench.~~

~~Exception No. 1: Conductors in parallel in raceways or cables shall be permitted, but each raceway or cable shall contain all conductors of the same circuit including grounding conductors.~~

~~Exception No. 2: Isolated phase, polarity, grounded conductor, and equipment grounding and bonding conductor installations shall be permitted in nonmetallic raceways or cables with a nonmetallic covering or nonmagnetic sheath in close proximity where conductors are paralleled as permitted in 310.4, and where the conditions of 300.20(B) are met.~~

Substantiation:

This is a companion proposal to 300.3(B).

The text in both 300.3(B) and 300.5(I) is almost the same and should not be repeated. 300.3(B) already covers installations in trenches, which would be underground, as well as raceway and cable.

It is proposed to have 300.3(B) include all the requirements for above ground and underground installations and have 300.5(I) refer back to 300.3(B).

Panel Meeting Action: Reject

Panel Statement:

Even though the text in Sections 300.3(B) and 300.5(I) are similar in nature, Section 300.5(I) provides the user of the Code with very clear information where dealing with underground conductors. Referring the user back to 300.3(B) may tend to cause confusion since the proposed exception as written deals with both above ground and below ground paralleled installations.

The existing exceptions in these two sections appear to be very specific and clear as to their meaning and application. Any effort to relocate, shorten, or delete the text would tend to cause confusion and would be counter effective.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-49 Log #2197 NEC-P03 (300-5(I)) **Final Action: Reject**

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:

(I) Conductors of the Same Circuit. All conductors of the same circuit and, where used, the ~~grounded~~ earth conductor and all equipment grounding conductors shall be installed in the same raceway or cable or shall be installed in close proximity in the same trench.

Exception No. 1: Conductors in parallel in raceways or cables shall be permitted, but each raceway or cable shall contain all conductors of the same circuit including grounding conductors.

Exception No. 2: Isolated phase, polarity, ~~grounded~~ earth conductor, and equipment grounding and bonding conductor installations shall be permitted in nonmetallic raceways or cables with a nonmetallic covering or nonmagnetic sheath in close proximity where conductors are paralleled as permitted in 310.4, and where the conditions of 300.20(B) are met.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.

I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.

The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.

I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

See Panel Statement on Proposal 3-6.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-50 Log #1232 NEC-P03 **Final Action: Reject**
(300-5(K))

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
(K) Directional Boring. Cables or raceways installed using directional boring equipment shall be listed ~~approved~~ for the purpose.

Substantiation:

The word "approved" is defined as "Acceptable to the authority having jurisdiction." That means the inspector is required to have the responsibility of accepting the correct raceway or cabling system that can be used with directional drilling equipment. It is not always safe to assume a thicker wall product or products made of certain material will perform satisfactory with directional drilling equipment. The listing requirement will satisfy the inspector and contractors while providing any special limitations (pull strength, tensile yields) that would be needed for a safe installation.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not provided sufficient technical substantiation that a problem exists where installing cables or conduit by a directional boring machine. Additional studies may be necessary to determine the extent of the problem and the type of raceways or cables that may be involved in possible damage, if any. Depth of the installation, type of cable or raceway being installed, and amount of strain involved is difficult for the inspector to verify after the installation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

CASPARRO: This proposal should be accepted. It would be very difficult if not impossible for an electrical inspector to evaluate a product of this type for suitability of installation and use. Listed Directional Boring raceways are available and should be required to ensure that the raceway and the installed conductors are not damaged during installation.

3-51 Log #1801 NEC-P03 **Final Action: Accept in Principle in Part**
(300-6)

Submitter: William A. Wolfe, Steel Tube Institute of North America

Recommendation:

Revise text to read as follows:

300.6 Protection Against Corrosion. ~~Metal r~~Raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, elbows, couplings, nipples, fittings, supports, and support hardware shall be of materials suitable for the environment in which they are to be installed.

(A) ~~General~~ Ferrous Metal. Ferrous metal raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, metal elbows, couplings, nipples, fittings, supports, and support hardware shall be ~~suitably~~ protected against corrosion inside and outside (except threads at joints) by a coating of approved corrosion-resistant material s~~uch as zinc, radium or enamel. Where protected from corrosion solely by enamel, they shall not be used outdoors or in wet locations as described in 300.6(C). Where boxes or cabinets have an approved system of organic coatings and are marked "Rainright", "Rainproof", or "Outdoor Type", they shall be permitted outdoors.~~ Where ~~corrosion protection is necessary and~~ the conduit is threaded in the field, the threads shall be coated with an approved electrically conductive corrosion-resistant compound.

Exception: Stainless steel is not required to have protective coatings(s).

(1) Protected from Corrosion Solely by Enamel. Where protected from corrosion solely by enamel, they shall not be used outdoors or in wet locations as described in 300.6~~(C)~~(D). Where boxes or cabinets have an approved system of organic coatings and are marked "Raintight," "Rainproof," or "Outdoor Type," they shall be permitted outdoors.

~~(B)~~(2) In Concrete or in Direct Contact with the Earth. Ferrous ~~or nonferrous~~ metal raceways, cable armor, boxes, cable sheathing, cabinets, elbows, couplings, nipples, fittings, supports, and support hardware shall be permitted to be installed in concrete or in direct contact with the earth, or in areas subject to severe corrosive influences where made of materials(s) ~~judged suitable~~ approved for the condition, or where provided with supplementary corrosion protection approved for the condition.

(B) Non-ferrous Metal. Non-ferrous cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, elbows, couplings, nipples, fittings, supports, and support hardware embedded or encased in concrete or in direct contact with soil shall be provided with supplementary corrosion protection.

(C) Nonmetallic. Nonmetallic raceways, cable trays, cablebus, auxiliary gutters, boxes, cable armor or sheathing, cabinets, elbows couplings, nipples, fittings, supports, and support hardware shall be made of material approved for the condition, and shall comply with 1, 2, and 3 as applicable to the specific installation.

(1) Exposed to Sunlight. Where exposed to sunlight the materials used shall be identified as sunlight resistant.

(2) Chemical Exposure. Where subject to exposure to chemical solvent, vapors, splash, or immersion, materials or coatings identified for the specific reagent shall be used.

(3) Temperature Extremes. Where exposed to environments having extreme temperatures, the material shall not be used beyond its listed temperature limitations.

~~(C)~~(D) Indoor Wet Locations. In portions of dairy processing facilities, laundries, canneries, and other indoor wet locations, and in locations where walls are frequently washed or where there are surfaces of absorbent materials, such as damp paper or wood, the entire wiring system, where installed exposed, including all boxes, fittings, conduits, and cable used therewith, shall be mounted so that there is at least a 6mm (1/4-in.) airspace between it and the wall or supporting surface.

Exception: Nonmetallic raceways, boxes, and fittings shall be permitted to be installed without the airspace on a concrete, masonry, tile, or similar surface.

FPN: In general, areas where acids and alkali chemicals are handled and stored may present such corrosive conditions, particularly when wet or damp. Severe corrosive conditions may also be present in portions of meatpacking plants, tanneries, glue houses, and some stables; in installations immediately adjacent to a seashore and swimming pool areas; in areas where chemical deicers are used; and in storage cellars or rooms for hides, casings, fertilizer, salt, and bulk chemicals.

Substantiation:

In working with UL on revisions to conduit standards we realized that this Article is in need of rewrite for clarification and expansion of criteria. It has been divided into three different types of wiring methods with associated accessories as each has its own needs relative to maintaining acceptable protection over a period of time. The three are Ferrous Metal, Non-Ferrous Metal, and Nonmetallic.

The Ferrous Metal requirements are primarily a rearrangement of text, other than (a)(2).

• "Judged Suitable" has been changed to "Approved." This is more appropriate text because "Approved" is what would be required to judge something suitable. "Approved" is defined in Article 100, "judged suitable" is not.

• With regard to the word "supplementary", this clarifies questions we have received from the field; such as, is the zinc coating approved for direct burial and concrete encasement — other than severely corrosive areas. This sentence makes it clear that if the product is made from material(s) (which would be the base metal plus any factory coating) approved for the condition it is permitted. The UL listing information confirms this. An example of this would be zinc-coated rigid and IMC. It also clarifies that where approved supplementary protection has been applied (examples, plastic coating or wraps) products installed in areas subject to severe corrosive influences are appropriately protected.

The Non-ferrous Metal requirements correlate with the UL listing requirement and should be clear in the NEC.

The Nonmetallic requirements bring the requirements for protecting nonmetallics from environmental influences into an appropriate section of Article 300 and provide better assurance that all of these will be considered in design and installation. This is consistent with what is done for protecting metals from environmental influences. Exposure to sunlight and temperature extremes are not new requirements for nonmetallics in the NEC, they are merely relocated to a central NEC article. The addition of "Chemical Exposure" has been added as suggested by the representative of the Chemical Manufacturers Association during previous attempts at rewrites of wiring methods. This is a viable requirement because listings and marketing pieces for nonmetallics provide a list of the reagents for which the product is suitable. There are other chemicals to which nonmetallics are susceptible, just as metal is in certain environments.

This is a rewrite that is sorely needed for better interpretation and enforcement of the NEC.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle in Part

[Text of Proposal 3051 panel action is shown on page 2071]

Panel Statement:

Panel Statement:

1. Deterioration was added to the title of the Section to make it more consistent with the requirements provided in the Section.
2. Equipment was added to the titles of each of the subsections to more accurately describe what is being protected from corrosion and deterioration and is based on the definition of equipment in Article 100.
3. The definition was changed to comply with 90.5(B) and the NEC Style Manual for permissive language and "(s)" after "coatings" was removed since it was redundant.
4. The term "approved" was changed to "listed." There is now a listing category available for this product.
5. A new (2) was added to (A) with a new title of "Organic Coatings on Boxes or Cabinets." since the organic coatings on boxes and cabinets did not fit well under protection of enamel in (1) of the proposal.
6. In (C), "cable armor or sheathing" was changed to "cables with a nonmetallic outer jacket and internal metal jacket or armor" to be more consistent with the title of nonmetallic equipment and with MC cable with a nonmetallic outer jacket. "Cable sheathing" was added to deal with UF multiple conductor cables.
7. Parenthesis were placed around the (1) and (2) in the text to be consistent with the NEC Style Manual of hierarchy.
8. The text in (2) for chemical exposure was changed since some nonmetallic equipment and wiring methods are inherently resistant to chemicals based on the listing of that material and it would be overly restrictive to require each equipment or wiring method to be identified for each specific chemical agent.
9. (3) was deleted since temperatures for nonmetallic equipment should already be adequately covered in the specific article for that wiring method or equipment.
10. "Conduits" was changed to "raceways" since conduits would not cover tubing and other types of raceways.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

PACE: The panel should not have accepted requiring a "listed" compound for application to all field threads. No substantiation was provided to show that "non-listed" compounds are a problem. Just because a product listing category exists does not mean that it is necessary to require a listing of the products used. "Listed" products may be approved for use, but there is no justification to require "listed" products only.

The panel should not have accepted requiring that the compound be applied to all field threads. This will include installations where no protection from corrosion is needed such as indoor, dry locations. No substantiation was provided to show field cut threads installed in areas where they are not subject to corrosion need to be coated. The Panel Statement for action taken on Proposal 3-55 says "There has been no substantiation to justify requiring all threads for all raceways, including those raceways with factory galvanizing or other corrosion protection, to be recoated before installation". This logic applies to those not subject to corrosion as well. The requirement should be only for those applications where the installation is subject to deterioration due to corrosion.

Changes in the NEC should be well documented with appropriate substantiation to support the change.

3-52 Log #227 NEC-P03 **Final Action: Accept in Part**

(300-6(A))

Submitter: Gregory J. Steinman, Thomas & Betts Corporation

Recommendation:

Revise text to read as follows:

(A) General. Ferrous raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, metal elbows, couplings, fittings, supports, and support hardware shall be suitably protected against corrosion inside and outside (except threads at joints) by a coating of approved corrosion-resistant material such as zinc, cadmium, or enamel. Where protected from corrosion solely by enamel, they shall not be used outdoors or in wet locations as described in 300.6(C). Where boxes or cabinets have an approved system of organic coatings and are marked "Raintight," "Rainproof," or "Outdoor Type," they shall be permitted outdoors. Where corrosion protection is necessary and the conduit is threaded in the field, the threads shall be coated with an ~~approved~~ listed electrically conductive, corrosion-resistant compound.

Substantiation:

There are numerous compounds on the market that may not be appropriate for this use. Underwriters Laboratories Inc. created a product category for this specific application, (FOIZ) Electrically Conductive Corrosion Resistant Compounds. The Authority Having Jurisdiction should not be put in a position of evaluating the chemical composition or performance of a compound; let the laboratories do this work.

Panel Meeting Action: Accept in Part

Panel Statement:

See the Panel Action rewrite on Proposal 3-51 that should satisfy the submitter's concerns. The text in 300.6 was changed in Proposal 3-51 and this proposal included text that was changed so an accept in part was necessary.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

PACE: See my Explanation of Negative for Proposal 3-51 (Log #1801).

3-53 Log #576 NEC-P03 **Final Action: Reject**
(300-6(A))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Add new text as follows:
(A) General. Ferrous raceways..."Where boxes or cabinets have an approved system of organic coatings and are marked "Raintight", "Rainproof", "Watertight", ~~or~~ Outdoor Type, or with a Type Number from Table 430.91 For Outdoor Use, they shall be permitted outdoors...".

Substantiation:

The addition of "Watertight" is appropriate as the "Type Numbers" associated with this term require corrosion protection equivalent to or greater than those associated with the other present terms, "Raintight" and "Rainproof". See companion proposal for FPN in 430.91.

Panel Meeting Action: Reject

Panel Statement:

The term "watertight" denotes a much higher degree of protection than is required in this Section since the enclosure must be constructed such that water will not enter into the enclosure when subjected to a water stream. These types of enclosures are better covered in their particular articles since Article 300 is more of a general requirement for equipment.

While Table 430.91 is handy to study the types of available enclosures, this table is only used for motor controller enclosure ratings and should not be used as a reference in this section for other enclosures.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

EASTER: The original proposal should be accepted based on the substantiation given in the proposal.

The panel statement supporting their action focuses on the degree of protection from water exposure associated with the enclosure "Type Rating" associated with the term "watertight". Rather, we conclude that the focus is on the additional degree of corrosion protection required for this type of enclosure. Since the requirement for additional corrosion protection for particular types of enclosures are addressed in this section, we conclude this type should also be addressed here.

The reference to 430.91 is appropriate now based on the CMP 11 action on Proposal 11-61 and adds further clarity with respect to the standardized terms used in conjunction with "Type Ratings."

3-54 Log #3325 NEC-P03 **Final Action: Reject**
(300-6(A))

Submitter: Daleep C. Mohla Missouri City, TX

Recommendation:

Add to the last sentence:
When corrosion protection is necessary and the conduit is threaded in the field, the threads shall be coated with either a zinc coating compound or with an approved electrically conductive, corrosion resistant compound.

Substantiation:

Zinc coating compounds have a proven history of providing corrosion protection. These coating compounds are similar in performance and are compatible with galvanizing for corrosion protection normally provided by conduit manufacturers on ferrous conduits threads in the factory. This will provide some guidance to Authorities Having Jurisdiction on approving the coating compounds without requiring listing, which seems to be the precise intent of this panel when it included the requirement and opted to utilize "Approved". In absence of any guideline, Authorities Having Jurisdiction are insisting a listed coating compound.

Panel Meeting Action: Reject

Panel Statement:

One of the major concerns with a field applied zinc coating compound is its ability to be electrically conductive. There is a UL product category that can be found under category FOIZ for Electrically Conductive Corrosion Resistant Compounds.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-55 Log #3331 NEC-P03 **Final Action: Accept in Part**
(300-6(A))

Submitter: Charles M. Trout, Maron Electric Co. Inc.

Recommendation:

In the first sentence delete the words "except threads at joints".
In the last sentence delete the words "and the conduit is threaded in the field" and also delete the word "approved" and insert the word "listed" in its place.

Substantiation:

Steel conduit is by far the most widely used and best available equipment-grounding conductor when metal raceways are used. Threads at joints whether field threaded or factory threaded are the "weakest link in the chain" and every effort must be taken to ensure that the ground-fault return path is a permanent, low-impedance electrically conductive path. To except threads at joints appears to be contrary to the intent of this section. To consider only conduit threaded in the field is not enough. The coating that is factory applied on steel conduit threads is compromised as soon as a coupling or fitting is applied. Numerous times when couplings or fittings are installed, they are backed off to align properly in the installation. Applying a listed electrically conductive, corrosion-resistant compound aids "in assuring an effective grounding path because it acts as a lubricant and permits the joint to be screwed up tighter." "Conduit runs of rigid or intermediate metal, which are properly threaded and in which the couplings are set up tightly, preferably using a joint sealer that will not reduce continuity, may be expected to perform satisfactorily as an equipment-grounding conductor for runs of limited length."
The above quotes are taken from a widely used "Book on Grounding."
Listed electrically conductive corrosion-resistant compounds are readily available from manufacturers such as Thomas and Betts.

Panel Meeting Action: Accept in Part

Deleting the word "approved" and replacing it with "listed" is accepted and the remainder of the proposal is rejected.

Panel Statement:

There has been no substantiation submitted to justify requiring all threads for all raceways, including those raceways with factory galvanizing or other corrosion protection, to be recoated before installation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

PACE: See my Explanation of Negative for Proposal 3-51 (Log #1801).

3-56 Log #577 NEC-P03 **Final Action: Reject**
(300-6(C))

TCC Action:

The Technical Correlating Committee directs that the Panel clarify the Panel Action on this Proposal. This action will be considered by the Panel as a Public Comment.

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text as follows:
300.6(C) Indoor Wet Locations. In ~~portions of dairy processing facilities, laundries, canneries, and other~~ indoor wet locations, ~~and in locations where walls are frequently washed or where there are surfaces of absorbent materials, such as damp paper or wood,~~ the entire wiring sytem, where installed exposed, including all boxes, fittings, conduits, and cable used therewith, shall be mounted so that there is at least a 6-mm (1/4 in.) airspace between it and the wall or supporting surface.
Exception: Nonmetallic raceways, boxes, and fittings shall be permitted to be installed without the airspace on a concrete, masonry, tile, or similar surface.
FPN: In general, areas where acids and alkali chemicals are handled and stored may present such corrosive conditions, particularly when wet or damp. Severe corrosive conditions may also be present in portions of meatpacking plants, tanneries, glue houses, and some stables; in installations immediately adjacent to a seashore and swimming pool areas; in areas where chemical deicers are used; and in storage cellars or rooms for hides, casings, fertilizer, salt, and bulk chemicals. Examples of indoor wet locations include, but are not restricted to, portions of dairy processing facilities, laundries, canneries, and locations where walls are frequently washed or where there are surfaces of absorbent materials, such as damp paper or wood.

Substantiation:

The usability of this requirement will be improved by relocating the examples to the FPN. The requirement is now clear. We are confident that the Code-Making Panel did not intend for the examples in the body of the present text to be all inclusive.

Panel Meeting Action: Reject

Panel Statement:

The purpose of listing these various locations is not to have a laundry list of locations but to recognize by mandatory text that these particular locations must have a fl inch gap to permit water and chemicals to drain and not accumulate on top of the raceways, boxes, fittings where substantial deterioration can occur.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-57 Log #730 NEC-P03 **Final Action: Accept in Principle**
(300-6(C))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Replace the word "conduits" with "raceways".

Substantiation:

Edit. Wiring methods such as EMT are not specifically included. The exception includes other raceway wiring methods.

Panel Meeting Action: Accept in Principle

This change has been accomplished in the rewrite of this entire section in the Panel Action in Proposal 3-51.

Panel Statement:

This is not an editorial change as indicated in the submitter's substantiation since many more wiring methods will now be affected.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-58 Log #1198 NEC-P03 **Final Action: Reject**
(300-6(C) Exception)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Delete 300.6(C) Exception.

Substantiation:

This section only applies to metallic wiring methods. It does not apply to nonmetallic wiring methods. Although the installation of nonmetallic wiring methods without an 1/4 in. airspace will not degrade the raceway, it does hold moisture and the hardware will degrade or corrode. This exception should be deleted or relocated to a part of the code regulating the installation of nonmetallic raceways in corrosive areas.

Panel Meeting Action: Reject

Panel Statement:

The exception provides information necessary where dealing with indoor wet locations and nonmetallic installations. Without the exception, it would be very easy for someone to require nonmetallic raceways to have the fl inch spacing. A rewrite of this section in a previous proposal now makes this section apply to ferrous and nonferrous metal as well as nonmetallic equipment.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-59 Log #3274 NEC-P03 **Final Action: Reject**
(300-6(D) (New))

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 8 for possible action in the raceway articles. This action will be considered by Code-Panel 8 as a Public Comment.
This action will be forwarded to Code-Making Panel 5 for information.

Submitter: Leonard F. Devine, Jr. W. Palm Beach, FL

Recommendation:

Add a new section 300.6(D) to read as follows:
(D) Wet Location Raceways. In all raceways, installed either inside or on the exterior of a building or structure, in a wet location, except service entrance raceways, an equipment grounding conductor sized in accordance with 250.122 shall be installed in the raceway as to prevent the loss of grounding.

Substantiation:

It is not unusual to find that a metallic raceway has lost its ability to ground a system because of corrosion due to the constant exposure to corrosion, or a constant spraying of water, such as a car wash. All to often you find that conduit, run on the exterior of a building has been damaged for whatever reason and no longer provides a grounding path.

Panel Meeting Action: Reject

Panel Statement:

The requirements for grounding and bonding is not under the jurisdiction of CMP 3. Panel 5 has jurisdiction over grounding and bonding. Panel 8 has jurisdiction over raceways and the requirements for additional grounding for special conditions or applications.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-60 Log #43 NEC-P03 **Final Action: Reject**
(300-9)

NOTE: The following proposal consists of Comment 1-174 on Proposal 3-65 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 3-65 was:
Move the description of the first floor in Section 336.5(a)(1) to the new Section of 300.9.
Comment 1-174 received the following Technical Correlating Committee Note:
The Technical Correlating Committee directs that this Comment and Proposal 3-65 be reported as "Hold" to allow for correlation with Code-Making Panels 7 and 8 on 336.12(A) and 331.12, respectively. The definition will remain in 336.12(A)(1) for the 2002 NEC.

Submitter: Technical Correlating Committee National Electrical Code

Recommendation:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 1 for possible inclusion in Article 100. This action will be considered by the Panel as a Public Comment.

Substantiation:

This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the Regulations Governing Committee Projects.

Panel Meeting Action: Reject

Panel Statement:

The Panel accepts the direction of the TCC and notes the reassignment to Panel 1 for this definition, and Panels 7 and 8 for correlation during the 2002 NEC. A reject is required on this issue by Panel 3 since it remains outside the jurisdiction of CMP 3.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-61 Log #56 NEC-P03 **Final Action: Reject**
(300-9)

NOTE: The following proposal consists of Proposal 3-65 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This proposal was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE.

Submitter: Kylene Abram Germfosk, MI

Recommendation:

Move the description of the first floor in Section 336.5(a)(1) to the new Section of 300.9.

Substantiation:

The description of what is the first floor of a building is a general requirement that is used in more than just locations where nonmetallic-sheathed cable is installed and therefore should be located in Article 300. For example, the definition of first floor is also used in Section 331.3(a) Fine Print Note. This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the Regulations Governing Committee Projects.

Panel Meeting Action: Reject

Panel Statement:

The TCC has determined the location of this definition to be in Article 100 with Panel 1 having jurisdiction over the definition. Panels 7 and 8 have jurisdiction over the specific raceway and cable requirements.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-241 Log #43a NEC-P01 **Final Action: Reject**
(300-9)

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 8 for Comment because the term is used in Articles 362 and 382.

NOTE: The following proposal consists of Comment 1-174 on Proposal 3-65 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 3-65 was:

Move the description of the first floor in Section 336.5(a)(1) to the new Section of 300.9.

Comment 1-174 received the following Technical Correlating Committee Note:

The Technical Correlating Committee directs that this Comment and Proposal 3-65 be reported as "Hold" to allow for correlation with Code-Making Panels 7 and 8 on 336.12(A) and 331.12, respectively. The definition will remain in 336.12(A)(1) for the 2002 NEC.

Submitter: Technical Correlating Committee National Electrical Code

Recommendation:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 1 for possible inclusion in Article 100. This action will be considered by the Panel as a Public Comment.

Substantiation:

This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the Regulations Governing Committee Projects.

Panel Meeting Action: Reject

Panel Statement:

The panel concludes that this term is used as an applicable definition in only one article. Therefore, the panel concludes that a definition in Article 100 would not be necessary at this time nor would adding this definition in Article 100 add clarity to the way the definition is currently used in the NEC. The panel refers this proposal to Panels 7 and 8 for information.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

7-5 Log #43b NEC-P07 **Final Action: Reject**
(300-9)

NOTE: The following proposal consists of Comment 1-174 on Proposal 3-65 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 3-65 was:

Move the description of the first floor in Section 336.5(a)(1) to the new Section of 300.9.

Comment 1-174 received the following Technical Correlating Committee Note:

The Technical Correlating Committee directs that this Comment and Proposal 3-65 be reported as "Hold" to allow for correlation with Code-Making Panels 7 and 8 on 336.12(A) and 331.12, respectively. The definition will remain in 336.12(A)(1) for the 2002 NEC.

Submitter: Technical Correlating Committee National Electrical Code

Recommendation:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 1 for possible inclusion in Article 100. This action will be considered by the Panel as a Public Comment.

Substantiation:

This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the Regulations Governing Committee Projects.

Panel Meeting Action: Reject

Panel Statement:

336-5(a)(1) became 334.12(A)(1) in the 2002 Code. 334.12(A)(1) was revised by the Standards Council when they accepted 2002 Proposal 7-137 which, in addition to other revisions, deleted the text referred to in the proposal.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

8-5 Log #43c NEC-P08Meeting Action: Accept (300-9) **Final Action: Reject**

TCC Action: Reject

It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" to correlate with Code Making Panel 1's action on Proposal 1-241.

NOTE: The following proposal consists of Comment 1-174 on Proposal 3-65 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 3-65 was:
Move the description of the first floor in Section 336.5(a)(1) to the new Section of 300.9.
Comment 1-174 received the following Technical Correlating Committee Note:
The Technical Correlating Committee directs that this Comment and Proposal 3-65 be reported as "Hold" to allow for correlation with Code-Making Panels 7 and 8 on 336.12(A) and 331.12, respectively. The definition will remain in 336.12(A)(1) for the 2002 NEC.

Submitter: Technical Correlating Committee National Electrical Code

Recommendation:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 1 for possible inclusion in Article 100. This action will be considered by the Panel as a Public Comment.

Substantiation:

This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the Regulations Governing Committee Projects.

Panel Meeting Action: Accept

Panel Statement:

The panel accepts the recommendation of the TCC to move the definition of the "first floor" from 362.10 to Article 100.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

1-242 Log #56a NEC-P01 (300-9) **Final Action: Reject**

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 8 for Comment because the term is used in Articles 362 and 382.

NOTE: The following proposal consists of Proposal 3-65 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This proposal was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE.

Submitter: Kylene Abram Germfosk, MI

Recommendation:

Move the description of the first floor in Section 336.5(a)(1) to the new Section of 300.9.

Substantiation:

The description of what is the first floor of a building is a general requirement that is used in more than just locations where nonmetallic-sheathed cable is installed and therefore should be located in Article 300. For example, the definition of first floor is also used in Section 331.3(a) Fine Print Note. This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the Regulations Governing Committee Projects.

Panel Meeting Action: Reject

Panel Statement:

The panel concludes that this term is used as an applicable definition in only one article. Therefore, the panel concludes that a definition in Article 100 would not be necessary at this time nor would adding this definition in Article 100 add clarity to the way the definition is currently used in the NEC. The panel refers the submitter to Proposal 1-241. The panel refers this proposal to Panels 7 and 8 for information.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

7-6 Log #56b NEC-P07 **Final Action: Reject**
(300-9)

NOTE: The following proposal consists of Proposal 3-65 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This proposal was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE.

Submitter: Kylene Abram Germfosk, MI

Recommendation:

Move the description of the first floor in Section 336.5(a)(1) to the new Section of 300.9.

Substantiation:

The description of what is the first floor of a building is a general requirement that is used in more than just locations where nonmetallic-sheathed cable is installed and therefore should be located in Article 300. For example, the definition of first floor is also used in Section 331.3(a) Fine Print Note. This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the Regulations Governing Committee Projects.

Panel Meeting Action: Reject

Panel Statement:

The action taken by the Standards Council when they accepted 2002 Proposal 7-137 eliminated the need for this description.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

8-6 Log #56c NEC-P08 **Final Action: Reject**
(300-9)

NOTE: The following proposal consists of Proposal 3-65 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This proposal was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE.

Submitter: Kylene Abram Germfosk, MI

Recommendation:

Move the description of the first floor in Section 336.5(a)(1) to the new Section of 300.9.

Substantiation:

The description of what is the first floor of a building is a general requirement that is used in more than just locations where nonmetallic-sheathed cable is installed and therefore should be located in Article 300. For example, the definition of first floor is also used in Section 331.3(a) Fine Print Note. This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the Regulations Governing Committee Projects.

Panel Meeting Action: Reject

Panel Statement:

Panel 8 does not have jurisdiction over Article 336 (1999 NEC).

Also refer to the panel action and statement on Proposal 8-5.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

3-62 Log #2655 NEC-P03 **Final Action: Reject**
(300-11)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Revise existing Section 300.11 as follows and renumber the following subsections:

300.11 Securing and Supporting.

(A) Secured in Place. Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place. Cables and raceways shall not be supported by ceiling grids.

(B) Support wires. Support wires for ceiling grids that do not provide secure support of raceways, cable assemblies, boxes, cabinets, and fittings shall not be permitted as the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. ~~Cables and raceways shall not be supported by ceiling grids.~~

Substantiation:

This proposal intends to make editorial changes to the section.

Adding a section with a title for the sentences on support wires will add clarity. Presently, the requirements on using support wires, which are specific, are included in the section that provides a general requirement for raceways, cable assemblies, boxes, cabinets, and fittings.

Panel Meeting Action: Reject

Panel Statement:

The proposed separation of the first sentence from the remainder of the first paragraph requires added text that does not provide additional clarity to the subject. The existing paragraph, as presently written, does deal with proper support of raceways, cable assemblies, boxes, cabinets and fittings and further subdivision could create confusion.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-64 Log #956 NEC-P03 **Final Action: Reject**
(300-11(A))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Revise text to read as follows:
"...fastened in the place except where wiring methods are fished, as specifically permitted by the applicable article".

Substantiation:

As presently worded, the requirement is inaccurately and unnecessarily over-general. It would not be appropriate to go into detail in 300.11 as to which wiring methods may be fished where, just as it is not necessary to delineate here how closely they need to be secured and supported, and where requirements can be modified to accommodate vibration or interchange. However, it costs little to add a baker's dozen words to correct a statement that is technically untrue, as it seems to deny the legitimacy of fishing.

Panel Meeting Action: Reject

Panel Statement:

It is not necessary to add the proposed additional text since Section 300.1(A) already states that Article 300 covers wiring methods for all wiring installations, unless modified by other articles. Since other specific articles provide alternate methods where fishing of wiring methods are permitted, the submitter's statement in the substantiation that the requirement is "inaccurately and unnecessarily over-general" is incorrect.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-65 Log #2410 NEC-P03 **Final Action: Reject**
(300-11(A))

Submitter: Wayne Sargent, City of Salem, Oregon

Recommendation:

300.11 Securing and Supporting.
(A) Secured in Place. Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place. Support wires that do not provide secure support shall not be permitted as the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. Ceiling grids shall not support cables and raceways, including short unsupported lengths allowed by 320.30, 330.30, and 334.30.

Substantiation:

The problem is an apparent conflict between the intent of 300.11(A) to keep cables and raceways off of the ceiling grid system, and the three wiring methods [AC, MC and NM cable] permitted to be unsupported in short lengths. With recent changes to Chapter 8, it appears to be the intent of the NEC to clean up the area above suspended ceilings. These short unsupported “whips” above grids are often installed in standard 1.8 m [6 foot] lengths. Most electricians tie these up in some way; however, many times they are left laying on the grid. If it is only 2 feet from the j-box to the luminaire, there can be 4 feet of cable resting on the ceiling grid if they interpret the permission to be unsupported that is granted by the applicable wiring method section [320.30(B)(3), 330.30(B)(2), and 334.30(B)(2)], as permission to ignore 300.11(A).

Panel Meeting Action: Reject

Panel Statement:

The purpose of the statement that ceiling grids shall not support cables and raceways is to keep these cables and raceways from being clipped to the actual ceiling grid, not the grid support wires. That's covered in (A)(1) and (A)(2).
Section 300.1(A) states that Article 300 covers wiring methods for all wiring installations, unless modified by other articles. Luminaire (fixture) whips do not have to be supported for the last 6 feet from the luminaire. This permits the luminaire to be easily relocated, as may be necessary. Permission is given in the specific article dealing with Type AC cable, Type MC cable, and Type NM cable.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-66 Log #2770 NEC-P03 **Final Action: Reject**
(300-11(A))

Submitter: Douglas Hansen, Codecheck

Recommendation:

Revise 300.11 by deleting words "secured to, or" and deleting "from part of the fire rated design."
Extend requirement for distinguishable wiring support to non-fire rated ceilings, and add a fine print note to clarify the intent, as follows:
300.11 Securing and Supporting.
(A) Secured in Place. Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place. Support wires that do not provide secure support shall not be permitted as the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. Cables and raceways shall not be supported by ceiling grids.
(1) Fire-Rated Assemblies. Wiring located within the cavity of a fire-rated floor–ceiling or roof–ceiling assembly shall not be supported by the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means.
Exception: The ceiling support system shall be permitted to support wiring and equipment that have been tested as part of the fire-rated assembly.
FPN No. 1:One method of determining fire rating is testing in accordance with NFPA 251-1999, Standard Methods of Tests of Fire Endurance of Building Construction and Materials.
FPN No. 2: Care must be taken not to add significant lateral loads to suspended ceilings.
(2) Non–Fire-Rated Assemblies. Wiring located within the cavity of a non–fire-rated floor–ceiling or roof–ceiling assembly shall not be secured to or supported by the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means.
Exception: The ceiling support system shall be permitted to support branch-circuit wiring and associated equipment where installed in accordance with the ceiling system manufacturer's instructions.

Substantiation:

Independent supports are permitted to be secured to the ceiling grid provided they are distinguishable and in addition to the required ceiling support wires, as illustrated in the IAEI Analysis of the 1999 NEC which shows examples of exactly such an installation. However, the present wording contains an internal contradiction by requiring independent supports to be secured at each end and then stating that they cannot be secured to the ceiling grid. The actual issue here is additional lateral loading of the ceiling, which the proposal addresses through a fine print note. The requirement for distinguishing the support wires is also important in non-rated ceilings. Though there is not an issue there in terms of the fire-rated design, there are still issues of conformance to the building code, standards, and manufacturer instructions.

Panel Meeting Action: Reject

Panel Statement:

There appears to be a misunderstanding by the submitter of the existing text in both (A)(1) and (A)(2). Both of these subsections state that wiring cannot be secured to the ceiling grid itself or to the ceiling grid wires. It does not state that additional cable and raceway support wires cannot be installed and these wires attached at one end to the ceiling grid. Attaching this electrical wiring to separate support wires would not provide a load to the ceiling grid since the support wire is carrying the load, not a grid wire or the grid itself.
Identifying these separate support wires in some method that will differentiate them from the fire-rated ceiling grid is necessary to permit the inspector to easily identify which support wires go to the ceiling grid and which are for the electrical system. Ensuring that the fire rated ceiling assembly is not compromised is a real safety issue. Anything we can do to make sure it will function as a fire barrier should be done.
Non-fire-rated ceiling systems are not as critical since failure of the ceiling will not have the serious consequences as the fire rated ceiling so identification of the electrical wire support system is not necessary.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

CASPARRO: Identification of independent support wires is necessary regardless of whether they are installed in a fire rated or non-fire rated assembly. Additional loading on the ceiling assembly due to cables supported by the ceiling support wires can cause premature collapse of the ceiling in an emergency situation not allowing safe egress of occupants from the building. Also it is difficult if not impossible for an inspector to evaluate whether a support wire used to support cables is independent of the ceiling support system without some means of permanent identification.

3-63 Log #156 NEC-P03 **Final Action: Reject**
(300-11(A), 300.11.(A) (1))

Submitter: W. Creighton Schwan Hayward, CA

Recommendation:

Resolve this conflict.
300.11(A) "Where independent support wires are used, they shall be secured at both ends."
300.11(A)(1) "wiring...shall not be secured to...the ceiling assembly."

Substantiation:

This conflict must be resolved. It is not possible to secure the support wires at both ends and also not secure the lower end to the ceiling assembly.

Panel Meeting Action: Reject

Panel Statement:

The Panel does not see a conflict between the two sections as indicated in the proposal. Independent support wires can be secured to the ceiling grid and the roof/floor assembly. The word "independent" is meant to imply a separate wire from the wires installed as ceiling grid support. These support wires are not permitted to trapeze and must be connected at both ends to ensure the raceways or cables do not swing. This is consistent in both the first paragraph and (A)(1).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-67 Log #962 NEC-P03 **Final Action: Accept in Principle in Part**
(300-11(A)(1))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add text to read as follows:
"Wiring located within the cavity of a fire-rated...assembly shall not be directly secured to or supported by the ceiling assembly, including the ceiling support wires. Independent support wires shall be permitted to be attached to the assembly."

Substantiation:

The similarity of the terms, "ceiling support wires" and "independent support wires," not to mention "wiring," plus the fact that the adjectives "independent" and "ceiling" are not always used, makes it presently seem that 300.11(A) and 300.11(A)(1) contradict each other.

Panel Meeting Action: Accept in Principle in Part

Text to read as follows,
"Wiring located within the cavity of a fire-rated...assembly shall not be secured to or supported by the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly." Remainder of the existing text is unchanged.

Panel Statement:

Inserting the word "directly" in the first sentence could cause confusion, and is not substantiated. The recommended additional sentence was combined with the existing sentence concerning independent support means as an editorial addition to the existing sentence.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-68 Log #420 NEC-P03 **Final Action: Reject**
(300-11(C)() Exception (New))

Submitter: Roger Downs, State Electrical Division

Recommendation:

Add text to read as follows:
Exception: Vertical runs of cable shall be allowed to support other vertical cables to provide spacing required by 300.4(D).

Substantiation:

Cable ties which bundle NM cable in wall spaces to maintain 1 1/4 in. spacing do not add additional stress to other cables.

Panel Meeting Action: Reject

Panel Statement:

Simply connecting these cables together with cable wraps or ties does not constitute a means of support from one cable to another. Supporting one cable from another can cause stress and unwanted damage to the cables and also not provide the required support for either cable. Undue stress to a cable can cause the cable to be pulled from its connector with possible damage to the internal conductors.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-69 Log #2681 NEC-P03 **Final Action: Accept in Principle in Part**
(300-11(C) Exception)

Submitter: Phil Simmons, Simmons Electrical Services / Rep. National Armored Cable Manufacturers Assn.

Recommendation:

(C) Cables Not Used as Means of Support. Cable wiring methods shall not be used as a means of support for other cables, raceways, or nonelectrical equipment.
Exception: Cables that contain only Class 2 circuit conductors that are solely for the purpose of connection to the control circuits of the equipment shall be permitted to be supported from Type AC or Type MC cables used as the power supply for the equipment. The Type AC or MC cables shall be supported in accordance with the requirements in their respective article.

Substantiation:

Type AC and MC cables are robust as they are constructed with aluminum or steel armor. As a result, the cables can safely support the light weight of Class 2 control cables such as thermostat cables to the equipment supplied by the Type AC or MC cables.

Panel Meeting Action: Accept in Principle in Part

Accept the first sentence of the proposed exception by deleting the second word "that" and change "contain" to "containing" and reject the last sentence. The Exception to read as follows:

Exception: Cables containing only Class 2 or Class 3 circuit conductors that are solely for the purpose of connection to the control circuits of the equipment shall be permitted to be supported from Type AC or Type MC cables used as the power supply for the equipment.

Panel Statement:

Changing the text in the first sentence of the exception was for editorial purposes only. The proposed second sentence was not necessary since support of the cables is already a requirement in their respective articles. Class 3 wiring methods shall be permitted to substitute for Class 2 wiring with no adverse effects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

CASPARRO: This proposal should be rejected. Type AC and MC cable is not intended to be a support system for other cables. The term "robust" as used in the substantiation is vague and by its definition does not provide the sufficient technical data to support this change. Also, there is no requirement to limit the length of or the number of Class 2 wires that could be supported from a single type AC or MC cable. This could lead to a situation that could overburden the cable that is being used as a means of support.

3-70 Log #352 NEC-P03 **Final Action: Reject**
(300-11(D) (New))

Submitter: John Freeman Orange City, FL

Recommendation:

New section would be 300-11(D) following 300-11(C) will read:
Vegetation such as trees or bushes shall not be used as means of mounting or support for boxes, conduit bodies, or conductors.

Substantiation:

230-10 vegetation such as trees shall not be used for support of overhead conductors (service). Live vegetation not covered beyond this article.
By including this subject in Article 300 as listed would clearly define misuse of listed items on "live vegetation."

Panel Meeting Action: Reject

Panel Statement:

Section 225.26 does not permit overhead feeder or branch circuit conductor spans to supported by vegetation and 230.10 does the same for overhead service conductors. However, if the branch circuits or feeders are supplied by an underground wiring system, conduit, cable, boxes, conduit bodies, and similar wiring and equipment can be adequately supported by trees and other substantial vegetation. The AHJ must approve the installation and any support must be adequate for the application.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-71 Log #2194 NEC-P03 **Final Action: Reject**
(300-13)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
300.13 Mechanical and Electrical Continuity - Conductors.
(A) General. Conductors in raceways shall be continuous between outlets, boxes, devices, and so forth. There shall be no splice or tap within a raceway unless permitted by 300.15; 368.8(A); 376.56; 378.56; 384.56; 386.56; 388.56; or 390.6.
(B) Device Removal. In multiwire branch circuits, the continuity of a ~~grounded~~ earth conductor shall not depend on device connections such as lampholders, receptacles, and so forth, where the removal of such devices would interrupt the continuity.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

See Panel Statement on Proposal 3-6.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-72 Log #256 NEC-P03 **Final Action: Reject**
(300-13(B))

Submitter: James M. Daly, General Cable

Recommendation:

Delete "multiwire".

Substantiation:

The continuity of the grounded conductor should be maintained in any branch circuit and not just in multiwire branch circuits.

Panel Meeting Action: Reject

Panel Statement:

The continuity of all conductors is important in a circuit but the safety of personnel working on a multiwire branch circuit is critical and is the purpose of this section. If a neutral connection in a multiwire branch circuit is lost by the removal of a receptacle or a lampholder, a person working on the circuit could check the other ungrounded conductor to neutral and incorrectly assume that both circuits were deenergized.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-73 Log #3317 NEC-P03 **Final Action: Reject**
(300-13(B), FPN (New))

Submitter: George Ferguson, Washtenaw Community College

Recommendation:

Add a Fine Print Note to 300.13(B) to read as follows:
FPN: Where more than one ungrounded conductor of a multiwire branch circuit is present in a box supplied from different overcurrent devices and a common grounded conductor is spliced in the box, opening the grounded conductors with an ungrounded conductor energized can cause an unbalanced voltage, possibly causing damage to connected equipment and creating a shock hazard. Providing a disconnecting means which opens all ungrounded conductors of the multiwire branch circuit will prevent this from occurring.

Substantiation:

I have seen numerous occasions where one conductor of a multiwire branch circuit is shut off. Then without realizing that other conductors using this common neutral are still energized, the electrician opens the splices in the grounded conductor. This often causes unbalanced voltages and energizes on of the "grounded" conductor with return current. This condition has often resulted in an electrician receiving a serious shock. The unbalanced voltage usually results in damage occurring in connected equipment. Having a disconnecting means open all ungrounded conductors will provide additional safety for persons and equipment.

Panel Meeting Action: Reject

Panel Statement:

This information is already substantially provided in a comment in the NEC Handbook for this particular section and is better left as Handbook material. There are many places in the NEC where similar information could be inserted into the Code but Section 90.1(C) states that the Code is not an instruction manual for untrained personnel. Inserting Fine Print Notes of this type would make the NEC an instruction manual.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-74 Log #2287 NEC-P03 **Final Action: Reject**
(300-14)

Submitter: Ryan Foster, Lea Electric

Recommendation:

Revise text as follows:
Where the opening to an outlet, junction, or switch point is less than 200 mm (8 in.) in any dimension, each conductor shall be long enough to extend at least ~~(75 mm (3 in.))~~ (5 in.) outside the opening.

Substantiation:

Three inches of conductor to install a device is not enough. It allows almost no play or room for error. If the conductors need to be trimmed back in the future, there is not enough conductor to do it.

Panel Meeting Action: Reject

Panel Statement:

A Task Group consisting of Panel 9 members (having jurisdiction over Article 314) and Panel 3 (having jurisdiction over Article 300) studied and reviewed the issues raised by proposals in both the 1996 and the 1999 Code process, and determined the present text in 300.14. Where boxes or plaster rings had openings that were smaller than 8 inches in any dimension, a 6 inch conductor may not have sufficient length to project more than a few inches outside the box or ring, depending upon where the conductors actually entered the box. It was decided that the conductors entering into the box must be at least 6 inches long measured from the point in the box where the conductor emerges from the raceway or cable sheath and then have at least 3 inches outside the opening. This would permit easy splicing of the conductors within the box or connection to most devices without unduly overfilling the box.

Adding an additional 2 inches may overfill the enclosure. Adequate substantiation has not been provided for justifying this additional length.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-75 Log #2336 NEC-P03 **Final Action: Reject**
(300-14)

Submitter: David J. Carroll, Encompass Electrical Technologies- Rocky Mountain Region

Recommendation:

Revise text as follows:

Length of Free Conductors at Outlets, Junctions, and Switch Points. At least 150 mm (6 in.) of free conductor, ~~measured from the point in the box where it emerges from its raceway or cable sheath,~~ measured from the exterior edge of box, shall be left at each outlet, junction, and switch point for splices or the connection of luminaires (fixtures) or devices. Where the opening to an outlet, junction, or switch point is less than 200 mm (8 in.) in any dimension, each conductor shall be long enough to extend at least ~~75 mm (3 in.)~~ 150 mm (6 in.) outside the opening.

Exception: Conductors that are not spliced or terminated at the outlet, junction, or switch point shall not be required to comply with 300.14.

Substantiation:

NEC 300.14 Length of Free Conductors at Outlets, Junctions, and Switch Points states: "At least 150 mm (6 in.) of free conductor, measured from the point in the box where it emerges from its raceway or cable sheath, shall be left at each outlet... "The problem with this code statement is that (6 in.) of free conductor should be measured from the exterior of the box instead of the "point in the box where it emerges from its raceway or cable sheath". This in turn, would change "at least 75 mm (3 in.) outside the opening" to at least 150 mm (6 in.) outside the opening. The primary reason for changing the article's point of measurement is in regards to safety. Measuring from the point in the box from the raceway or cable sheath actually shortens the total overall length of free conductor that extends beyond the box. The shortened length of conductor makes it difficult to work on a device safely when that device is serviced or exchanged. It is possible to damage the conductor on the edge or side of the box while trying to access the termination points on a device, such as a receptacle. The bare conductor and metal box could cause an overcurrent condition, resulting in a potential fire hazard. Another problem with the shortened conductor length is in regards to replacing a receptacle that can not be de-energized. Such a situation may occur in a hospital or industrial application. This could be a potential electrical shock hazard to the individual servicing the device.

Solution to the Problem:

The safest solution to the problem would be to change the point at which the conductor length is measured from. The measurement for the (6 in.) free conductor length should be measured from the exterior (outer) edge of the box, rather than the raceway or cable sheath within the box. Measuring from the exterior edge would give a better working clearance away from the box, making it less likely to damage the conductor and would also make it easier to manipulate an energized device. A greater working clearance would then be safer without question.

Panel Meeting Action: Reject

Panel Statement:

See the first paragraph in the Panel Statement in Proposal 3-74.

Adding an additional 6 inches will most likely overfill the enclosure. Adequate substantiation has not been provided for justifying this additional length.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-76 Log #1233 NEC-P03 **Final Action: Accept**
(300-15)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

300.15 Boxes, Conduit Bodies, or Fittings — Where Required. A box shall be installed at each outlet and switch point for concealed knob-and-tube wiring.

Fittings and connectors shall be used only with the specific wiring methods for which they are designed and listed.

Where the wiring method is conduit, tubing, Type AC cable, Type MC cable, Type MI cable, nonmetallic-sheathed cable, or other cables, a box or conduit body ~~complying with Article 314~~ shall be installed at each conductor splice point, outlet point, switch point, junction point, termination point, or pull point, unless otherwise permitted in 300.15(A) through (M).

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.

4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.

4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ''grounded in accordance with Article 250'' unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-77 Log #4 NEC-P03 (300-15(I)) **Final Action: Accept in Principle**

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 9 for information.

NOTE: The following proposal consists of Comment 3-49 on Proposal 3-81 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 3-81 was:

[Text of (May 2001) Proposal 3-81 is shown on page 2071]

Submitter: Don W. Jhonson, ESP of South Florida, Inc.

Recommendation:

Add new text as indicated:

300-15(i) Enclosures. A box or conduit body shall not be required where a splice, switch, terminal or pull point is in a cabinet or cutout box, in an enclosure for a switch or overcurrent device as permitted in Section 373-8, in a motor controller as permitted in Section 430-10(a), or in a motor control center. A box or conduit body shall not be required where a splice, tap or pull point is in an approved underground handhole and conductors are listed for wet location where the wiring method is conduit, tubing, or direct burial cables.

Substantiation:

The problem is the widespread industry practice of using underground handholes for the distribution of underground branch wiring in conduit systems, which is presently not permitted by 300-15. The handholes are often used in conjunction with underground PVC conduit as well as other approved wiring methods for the installation of landscape lighting, light poles, and other applications where an above ground box would pose a physical hazard such as parks and recreational areas. Listed wet location boxes are not designed for immersions during prolonged flooding conditions as experience in many parts of the country and have not been the equipment of choice due to the accumulation of water and potential fault conditions caused when standard splice connections are used within the box. The handhole would require a listed direct burial splice and allows for natural drainage through the open bottom where subject to heavy rain flooding. I have substantiated the practice of using these handholes as described through personal contact with other industry members and have found many felt the intent of the code permitted a conduit to be stubbed up within the handhole, a bushing/fitting installed, conduit sealed to prevent foreign entry, continuity maintained with bonding jumpers, conductors suitable for wet locations, splice/taps made with direct burial listed methods, covers secured and handhole grounded if metallic.

Panel Meeting Action: Accept in Principle

Add "and Handholes to the title of (L) and add "or Handholes" within the text of this Section to read as follows:

(L) Manholes and Handholes. Where accessible only to qualified persons, a box or conduit body shall not be required for conductors in manholes or handholes, except where connecting to electrical equipment. The installation shall comply with the provisions of Part IV of Article 314.

Panel Statement:

The addition of handholes is more appropriately addressed in subsection 300.15(L) since manholes permit personnel entry and may only have four walls and a cover which is similar to a handhole that permits hand or arm access inside the enclosure.

A joint task group composed of Panel 3 and Panel 9 members has addressed this issue and has suggested changes to 300.15 and Part IV of Article 314 for this Code cycle. The TCC Task Group on Usability of the NEC has proposed relocating Part IV of Article 314 to a new Part IV of Article 110. If this proposal with the appropriate changes to incorporate handholes is accepted by Panel 1 then the reference to Part IV of Article 314 in the last sentence of this subsection would be changed to "Part IV of Article 110."

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-78 Log #1407 NEC-P03 (300-15(J)) **Final Action: Accept in Principle**

Submitter: Ronald E. Maassen, Lemberg Electric Co., Inc. / Rep. NECA

Recommendation:

Add new level to Section 300.15 to read as follows:
Handhole Enclosure. A box or conduit body shall not be required for an underground splice, taps, or terminations provided they are terminated in an approved enclosure. The handhole enclosure, conductors, splices, tapes and terminations shall be listed for the environment of the installation. Conduits, ducts and fittings are not required to be mechanically connected to the handhole enclosure. All exposed conductive surfaces must be bonded or grounded in accordance with Article 250.

Substantiation:

To define the installation of handhole enclosures, the handhole enclosures are presently used through the country for underground installation, but not mentioned in the NEC.

Panel Meeting Action: Accept in Principle

Panel Statement:

See the Panel Action on Proposal 3-77. The addition of handholes is more appropriately addressed in subsection 300.15(L). Manholes permit personnel entry and may only have four walls and a cover that is similar to a handhole that permits hand or arm access inside the enclosure.

Adding the requirement for listing, environmental evaluations of the equipment, mechanical connection between the raceway and the handhole, and the bonding and grounding requirements are more appropriately placed in either Article 314 or in Article 110, since these are installation requirements. Section 300.15 should permit handholes as a permitted option but not provide all of the requirements for the installation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-79 Log #2918 NEC-P03 **Final Action: Reject**
(300-16)

Submitter: Dorothy Kellogg, American Chemistry Council

Recommendation:

Revise the subtitle of this section and add the words "on insulators" to "open wiring" and "mbessenger supported wiring" as shown below:

300.16 Raceway or Cable to Messenger Supported Wiring, Open Wiring on Insulators or Concaled Wiring.

(A) Box or Fitting. A box or terminal fitting have a separately bushed hole for each conductor shall be used wherever a change is made fromconduit, electrical metallic tubing, electrical nonmetallic tubing, nonmetallic-sheathed cable, Type AC cable, Type MC cable, or mineral-insulated, metal-sheathed cable and surface raceway wiring, to messenger supported wiring, open wiring on insulators, or to concealed knob-and-tube wiring.

Substantiation:

The phrase "open wiring" appears more than 30 times in the current 2002 NEC, but it exists in two distinct formats: a) as the defined term "open wiring on insulators" by Article 398.2, or b) simply as the undefined term "open wiring'. With the defined term, open wiring makes reasonable sense. However when used as the undefined term "open wiring", especially when used to describe a cable that is required to have mechanical integrity and protection takes on an entirely different meaning. Clearly such an installation is not "open". Due to the significant difference in the use of the terms, this and associated other proposals if accepted would replace the undefined use of the term "open wiring" with more appropriate language that addresses the installation in 501.4(B)(1)(5), 501.5 Exception No. 2; 503.3(B); 504.30(A)(1); 505.15(C)(1)(c); 505.16(C)(1) Exception No. 2; 610.12(A); 725.61(D)(4); and 727.4(4)(5)(6), and use the full 398.2 defined term where the text suggests as in 300.16(A); 312.5(B); 314.17(B); 314.17(C). Again, individual proposals have been submitted to address each section mentioned. Since the concept of open wiring may also have permitted messenger supported wiring, with this change, this term has been added.

Panel Meeting Action: Reject

Panel Statement:

The term "open wiring" refers to various wiring methods, other than just messenger supported and open wiring on insulators. Open wiring on insulators, as covered in Article 398, is permitted only for industrial and agricultural installations where installed on or in buildings. The term "open wiring", as referenced in Section 501.4(B)(1)(5), is being applied to Type ITC cable, which could be messenger supported as can be seen by the 5th item down in Table 396.10(A), installed on insulators, or simply as open wiring, as permitted by Article 727. The purpose of 300.16 is to require a box or terminal fitting for cables and similar wiring methods where converting to conduit, EMT, ENT, and similar wiring methods. Acceptance of this change would eliminate other wiring methods where a box would be required where converting from one method to another.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

PACE: The reason for removing the term "open wiring" is that 1) it is undefined (as opposed to the term "open wiring on insulators" that is defined) and 2) the words "open wiring" therefore mean different things to different people. This causes confusion, such as often being understood to be un-insulated. The attempt here is to use the term "exposed" rather than "open wiring" which is better understood in the field. This change should have been accepted by the panel.

The change from "open wiring" to "exposed" was accepted by this panel through its actions and panel statements on Proposals 3-218, 3-220, 3-221, and 3-222. The same logic, reasoning, and substantiation apply here as well.

3-80 Log #97 NEC-P03 **Final Action: Reject**
(300-16(A))

Submitter: James M. Daly, General Cable

Recommendation:

Near the end of the first sentence, revise to read "... to open wiring on insulators or to concealed..."

Substantiation:

This is one of a series of proposals to provide consistency throughout the code in the use of the terms "exposed", "open wiring", and "open runs" as applied to wiring methods.

"Exposed" is used 306 times throughout the code, "open runs" is used 7 times, and "open wiring" is used 29 times but only 10 of those instances do not refer to "open wiring on insulators".

Exposed is defined in Article 100 as shown below.

"Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated or insulated."

"Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access."

Open wiring on insulators is defined in 398.2 as "An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings."

"Open runs" is not defined in the code.

This series of proposals will limit the term "open wiring" to open wiring on insulators (Article 398) and have the term "exposed" apply to "open runs" and open wiring not on insulators.

Panel Meeting Action: Reject

Panel Statement:

See the Panel Statement for Proposal 3-79.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

PACE: See my Explanation of Negative for Proposal 3-79 (Log #2918).

3-81 Log #1052 NEC-P03 **Final Action: Accept in Principle**
(300-18(A))

Submitter: Wayne H. Robinson, Prince George County Government

Recommendation:

Add new text to read as follows:

300.18 Raceway Installations

(A) Complete Runs. Except as required by 300.5 Raceways, other than busways or exposed raceways having hinged or removable covers, shall be installed complete between outlet, junction, or splicing points prior to the installation of conductors.

Substantiation:

352.30 Securing and Supporting of Rigid Nonmetallic Conduit refers to 300.18, Raceway Installations, which requires conduit systems to be installed complete. 300.5(1), emerging from Grade, allows conduit or raceways to be installed as sleeves for physical protection. These sections are in disagreement with each other. Inserting "except as required by 300.5" will correct the present condition.

Panel Meeting Action: Accept in Principle

Change the recommendation in the proposal from "Except as required by 300.5" to an exception to read as follows:

"Exception: Short sections of raceways used to contain conductors or cable assemblies for protection from physical damage shall not be required to be installed complete between outlet, junction, or splicing points."

Panel Statement:

The text used in the exception in the Panel Action uses similar wording to Section 300.10, Exception No. 1, which deals with metal raceway continuity. The recommended text in the proposal with the reference to 300.5 would only cover those applications involving direct buried conductors or underground installations while the expanded exception in the Panel Action would also apply to any application where raceways are used as protection or sleeves. For example, NM cable protected by short pieces of raceways in an installation, where 1" X 2" furring strips are nailed to block walls, would also be covered.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-82 Log #1218 NEC-P03 **Final Action: Accept in Principle**
(300-18(A))

Submitter: Wayne H. Robinson, Prince George County Government

Recommendation:

Add text to read as follows:
300.18 Raceway Installations.
(A) Complete Runs. Except as required by 300.5 Raceways, other than busways or exposed raceways having hinged or removable covers, shall be installed complete between outlet, junction or splicing points prior to the installation of conductors.

Substantiation:

352.30 Securing and Supporting of Rigid Nonmetallic Conduit refers to 300.18 Raceway Installations, which requires conduit systems to be installed complete. 300.5(1), Emerging from Grade, allows conduit or raceways to be installed as sleeves for physical protection. These sections are in disagreement with each other. Inserting "except as required by 300.5" will correct the present condition.

Panel Meeting Action: Accept in Principle

Panel Statement:

See Panel Action and Statement for Proposal 3-81.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-83 Log #1234 NEC-P03 **Final Action: Reject**
(300-18(C))

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Add new text to read as follows:
(C) Bends — How Made. Bends for conduit and tubing shall be as designated in Table 300-18(C) and the associated raceway Articles.

INSERT Table 300.18(C) HERE

(Table shown on page 2699)

Substantiation:

This is a companion proposal to move Table 344.24 from Article 344 to Article 300. All raceway Articles refer to this table for the radius of conduit or tubing bends. It is appropriate that this table belongs in this general section.

Panel Meeting Action: Reject

Panel Statement:

The table in its present location in Article 344 and the references to that table in the other raceway articles should remain with Panel 8. Article 300 provides general application requirements for use, and specific applications should remain with the appropriate Article.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-84 Log #1861 NEC-P03 **Final Action: Reject**
(300-19(A))

Submitter: Andre R. Cartal, Princeton Borough Building Dept.

Recommendation:

Delete the exception.

Substantiation:

Steel wire armor cable as referenced in this exception remains elusive. I can find no further reference to this wiring method in the NEC or in any of the NRTL product directories. The exception first appeared in the 1975 edition of the NEC, but I have no access to any documentation. Since this product is not code recognized, there appears to be no reason to make any NEC reference to it.

Panel Meeting Action: Reject

Panel Statement:

The text in the 1974 NEC Preprint to the 1975 NEC appears to provide documentation that the exception was inserted to permit steel AC cable to be supported at the top of the riser. Throughout the text of the supporting comment for permitting this steel cable, the submitter continuously refers to the AC cable as wire armored cable and steel wire armored cable. He also states that this type of cable had been in use for 50 or more years in these applications without a single case of failure of a support for these cables.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-85 Log #2195 NEC-P03 (300-20) **Final Action: Reject**

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:

300.20 Induced Currents in Metal Enclosures or Metal Raceways.

(A) Conductors Grouped Together. Where conductors carrying alternating current are installed in metal enclosures or metal raceways, they shall be arranged so as to avoid heating the surrounding metal by induction. To accomplish this, all phase conductors and, where used, the ~~grounded~~ earth conductor and all equipment ~~grounding~~ conductors shall be grouped together.

Exception No. 1: Equipment grounding conductors for certain existing installations shall be permitted to be installed separate from their associated circuit conductors where run in accordance with the provisions of 250.130(C).

Exception No. 2: A single conductor shall be permitted to be installed in a ferromagnetic enclosure and used for skin effect heating in accordance with the provisions of 426.42 and 427.47.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.

I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.

The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.

I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

Changing the term "grounded" to "earth" is outside the jurisdiction of Panel 3 and must be acted on by Panel 5 for Article 250 and Panel 1 for definitions. Identifying the specific types of conductors, i.e., equipment grounding conductors, is necessary for clarity and identifies the grouping of all equipment grounding conductors. No substantiation has been provided for deleting the word "grounding." The word "conductors" is not new to Section 300.20.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-86 Log #677 NEC-P03 (300-20(A)) **Final Action: Reject**

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise first sentence: Where conductors carrying alternating current are installed in metal enclosures, or metal raceways, or metal-covered cables, they shall be arranged to avoid heating the surrounding metal by induction.

Substantiation:

Although installers don't control the arrangement of conductors within a metal-covered cable, they do control the arrangement and connection of the emerging conductors. Two 2-wire cables can be arranged and connected to provide a 4-wire circuit; three 2-wire cables can supply two 3-wire circuits with two same-phase conductors and two neutral conductors in each cable. This section specifically prohibits such arrangements for conductors in metal raceways, although already essentially covered in 300.3, and if deemed necessary, should also be applicable for metal cables.

Panel Meeting Action: Reject

Panel Statement:

Placing the recommended text into 300.20 is not necessary since installing multiple ferrous metal cables to supply a three- or four-wire circuit is a violation of 300.3(B). The suggestion in the submitter's substantiation that these multiple cables can be arranged to supply a single multiwire circuit is possible but is also a violation of 300.3(B). Adding additional text to deal with this already illegal application is not necessary.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-87 Log #1102 NEC-P03 (300-21) **Final Action: Reject**

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add this sentence:
"Raceways that penetrate fire-resistant-rated walls, floors, partitions or ceilings shall be firestopped with approved firestopping methods at each end of the raceway, to prevent the spread of fire or products of combustion from traveling through the raceway."

Substantiation:

I was called to building which had a fire in the main switchgear and the smoke traveled from the large raceways leaving the top of the switchgear, to the upper floors of the high-rise and filled the apartments with smoke that came in through pipes feeding the apartment panelboards. If these pipes were firestopped, this "chimney effect" would not have happened. Also, sometimes short sections of pipe are used as sleeves between floors or walls creating an easy path for smoke to follow. A little fireproof putty or fireproof caulk in the end of the pipe could save someone's life! Fire resistance directories require sleeves to be sealed.

Panel Meeting Action: Reject

Panel Statement:

Fire stopping all raceways that pass through a fire rated area would be almost impossible since these often consist of inch through 6-inch raceways, as well as cable bus, surface mounted raceways, busways, and all other similar wiring methods. The raceways would have to be fire stopped at each enclosure, junction point, or box after it left a fire rated area. There are many instances where the raceway may pass through a fire rated corridor into a non-fire rated area and back into the fire rated area many different times.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-88 Log #1235 NEC-P03 (300-21) **Final Action: Reject**

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
300.21 Spread of Fire or Products of Combustion.
Electrical installations in hollow spaces, vertical shafts, and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased. Openings around electrical penetrations through fire-resistant-rated walls, partitions, floors, or ceilings shall be firestopped using approved methods to maintain the fire resistance rating.
All metal and nonmetallic outlet boxes installed in the same cavity on opposite sides of fire rated wall assemblies shall use a classified wall opening protective material. Outlet boxes shall not be installed directly behind each other (back to back). All metal and nonmetallic outlet boxes installed in a stagger stud fire rated wall assemblies shall use a classified wall opening protective material.
FPN: Directories of electrical construction materials published by qualified testing laboratories contain many listing installation restrictions necessary to maintain the fire-resistive rating of assemblies where penetrations or openings are made. Building codes also contain restrictions on membrane penetrations on opposite sides of a fire-resistance–rated wall assembly. ~~An example is the 600-mm (24-in.) minimum horizontal separation that usually applies between boxes installed on opposite sides of the wall.~~ Assistance in complying with 300.21 can be found in building codes, fire resistance directories, and product listings.

Substantiation:

Metal conduits, nonmetallic conduits, cables, cable tray, water pipes or other wall penetrations are require to use a classified fire stopping material when penetrating a fire wall assembly. Outlet boxes should not be the exception to this rule and should not be relied on as the sole source of preventing fire from spreading from one room to another.
This revision will make it easier for the designers, contractors and inspectors to understand the proper installation of a outlet box when used in a fire classified wall assembly. The current outlet box classifications varies per the manufacturer and can be confusing causing outlet boxes being missed used. This proposal is an issue of safety and the prevention of the spread of fire within a building.

Panel Meeting Action: Reject

Panel Statement:

There are many different fire-rating scenarios based upon the different materials used in the fire rated wall or ceiling assembly and this information is available in the UL Fire Resistance Directories. The fire resistance of an assembly is tested on a case-by-case basis under the design information and the types of materials submitted for the fire test. The information on boxes and the related penetrations into these fire rated assemblies is very detailed and, again, is based upon actual test criteria of the particular box submitted for the fire test. Trying to condense this information into a few sentences to be added to this section would very possibly leave out very critical information about particular box installations. The basic concept is already provided in this section with a Fine Print Note directing the user to the information and is better left in the fire resistance directory with all its intricacies.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

KEDEN: The additions of he submitter's wording and deletion in the fine print note does not detract the end user from referring to the UL directories. The submitter's reason is that if raceway penetrations must be firestopped, then boxes must comply with the additional fire protection as well.

3-89 Log #1727 NEC-P03 **Final Action: Reject**
(300-22)

TCC Action:

The Technical Correlating Committee understands that the Standards Council has given primary responsibility to the Technical Committee on Air-Conditioning for combustible materials in plenums in cooperation with other committees including the National Electrical Code Committee.

The Chair of the Technical Correlating Committee will work with the Chair of the Technical Committeee on Air-Conditioning and appoint a Task Group to review the proposals affecting correlation between Code-Making Panels 3, 16, and the Technical Committee on Air-Conditioning.

In addition, the Technical Correlating Committee directs that this proposal be referred to the NFPA Committee on Air-Conditioning for comment.

Submitter: Marcelo M. Hirschler, GBH International / Rep. Fire Retardant Chemicals Association, Plenum Cable Association and Vinyl Institute EOTS

Recommendation:

Revise text to read as follows:

300.22 Wiring in Ducts, Plenums, and Other Air-Handling Spaces. The provisions of this section apply to the installation and uses of electric wiring and equipment in ducts, plenums, and other air-handling spaces.

FPN: See Article 424, Part VI, for duct heaters.

(A) Ducts for Dust, Loose Stock, or Vapor Removal. No wiring systems of any type shall be installed in ducts used to transport dust, loose stock, or flammable vapors. No wiring system of any type shall be installed in any duct, or shaft containing only such ducts, used for vapor removal or for ventilation of commercial-type cooking equipment.

(B) Ducts or Other Spaces ~~Plenums~~ Used for Environmental Air (Other than Plenums, Including Ceiling Cavity Plenums and Raised Floor Plenums). Only wiring methods consisting of Type MI cable, Type MC cable employing a smooth or corrugated impervious metal sheath without an overall nonmetallic covering, electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, or rigid metal conduit without an overall nonmetallic covering shall be installed in ducts or ~~plenums~~ other spaces specifically fabricated to transport environmental air (other than ceiling cavity plenums and raised floor plenums). Flexible metal conduit and liquidtight flexible metal conduit shall be permitted, in lengths not to exceed 1.2 m (4 ft), to connect physically adjustable equipment and devices permitted to be in these ducts and plenum chambers. The connectors used with flexible metal conduit shall effectively close any openings in the connection. Equipment and devices shall be permitted within such ducts or plenum chambers only if necessary for their direct action upon, or sensing of, the contained air. Where equipment or devices are installed and illumination is necessary to facilitate maintenance and repair, enclosed gasketed-type luminaires (fixtures) shall be permitted. Wiring methods installed in a plenum space shall be permitted to extend not more than 150 mm (6 in.) beyond the limits of the plenum space.

(C) ~~Other Space Used for Environmental Air~~ Plenums, Including Ceiling Cavity Plenums and Raised Floor Plenums . This section applies to plenums, including ceiling cavity plenums and raised floor plenums, ~~space~~ used for environmental air-handling purposes. Wiring methods installed in these plenum spaces shall be permitted to extend not more than 150 mm (6 in.) beyond the limits of the plenum space. This section does not apply to the following: (I) ~~other than~~ ducts or those other spaces used for environmental air ~~and plenums~~ as specified in 300.22(A) and (B) . ~~It~~ ; (ii) ~~does not include~~ habitable rooms or areas of buildings, the prime purpose of which is not air handling and (iii) joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces .

~~FPN: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.~~

~~Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.~~

(1) Wiring Methods. The wiring methods for ~~such other space~~ the plenum spaces specified in section 300.22 (C) shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor communications, control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables and conductors shall be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers.

(2) Equipment. Electrical equipment with a metal enclosure, or with a nonmetallic enclosure listed for the use and having adequate fire-resistant and low-smoke-producing characteristics, and associated wiring material suitable for the ambient temperature shall be permitted to be installed in ~~such other space~~ the plenum spaces specified in section 300.22 (C) unless prohibited elsewhere in this Code.

Exception: Integral fan systems shall be permitted where specifically identified for such use.

(D) Raised Floor Plenums for Information Technology Equipment. Electric wiring in ~~air-handling areas beneath raised floors~~ raised floor plenums for information technology equipment shall be permitted in accordance with Article 645. Equipment or materials installed in the raised floor plenum space shall be permitted to extend not more than 150 mm (6 in.) beyond the limits of the plenum space.

Substantiation:

This proposal does three things:

1. It accomplishes the intent of the proposals prepared by the Technical Committee on Air Conditioning and submitted by its chairman, Jeffrey Mattern, which is to clarify the language of the section and distinguish between the three types of spaces discussed in 300.22. Those spaces are: (A) Ducts for Dust, Loose Stock, or Vapor Removal (where no wiring systems of any kind are to be installed); (B) Ducts or Other Spaces Used for Environmental Air (where all wiring systems are to be enclosed in metal raceways), (C) Plenums (Including Ceiling Cavity Plenums and Raised Floor Plenums) (where wiring systems are to be listed for use in plenums, including plenum cables and raceways listed for the purpose) and (D) Raised Floor Plenums for Information Technology Equipment (which are actually a subset of the plenums described in 300.22 (C)). With the proposed changes, the new language makes the distinctions clearer.

2. It clarifies that any product listed for a specific purpose can extend a little bit (up to 6 inches) outside of the space where it is installed. This is important, so installers don't have to change wiring system when they need to make a connection to equipment placed

just outside a duct or plenum space. There are multiple examples in the NEC where materials are permitted to extend slightly beyond the original space, including the following: 110.26 (3), 210.52 (5) Exception, 300.50 (A) Exceptions 2 and 3, 426.22 (b), 520.42, 550.13 (G) (3), and Table 830.12. Moreover, the concept of using 6 inches as a small distance is used over 30 times in the NEC.

The proposed changes are consistent with the definition of "plenum" in both the NEC and NFPA 90A and the definitions of "ceiling cavity plenum" and "raised floor plenum" proposed by Jeffrey Mattern, chairman of the Technical Committee on Air Conditioning, responsible for NFPA 90A. The organizations making this proposal support the proposals made by Jeffrey Mattern.

"Plenum. A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system."

"Plenum, ceiling cavity. The space between the top of the finished ceiling and the underside of the floor or roof above where used to supply air to the occupied area, or to return or exhaust from the occupied area."

"Plenum, raised floor. The space between the top of the finished floor and the underside of a raised floor where used to supply air to the occupied area, or to return or exhaust air from or from the occupied area."

See also the statement and statistics related to fires in concealed spaces that are being provided in proposals associated with articles 725, 760, 770, 800, 820 and 830.

3. It adds "communications cables" to "control and power cables" as cables that can be listed specifically for use in plenum spaces. This was always understood but is being made explicit.

The three organizations represented in this proposal are submitting this proposal jointly as a single submission to avoid repetition at NFPA, per earlier instructions of NFPA staff. This joint submission is not intended to waive the ability of any of the groups to file separate proposals or comments in the future.

Panel Meeting Action: Reject

Panel Statement:

The submitter did not provide adequate substantiation for the proposed changes.

By changing the wording to "plenums, including ceiling cavity plenums and raised floor plenums" the scope of listing and use of plenum cables would be expanded to include duct distribution plenums, apparatus casing plenums and air handling unit room plenums.

The Air Conditioning Committee in NFPA 90A-2002, Standard for the Installation of Air Conditioning and Ventilating Systems, has specific requirements for cables installed in ceiling cavity plenums (4.3.10.2) and raised floor plenums (4.3.10.6). It also has requirements for supplementary materials installed in an air distribution system (4.3.3). Type CL2P, CL3P and FPLP cables listed in accordance with NFPA 262 do not meet the requirements for installation in the air distribution system, other than in ceiling cavity plenums and raised floor plenums.

This proposal's requirement that "Wiring methods installed in plenum space shall be permitted to extend not more than 150mm (6 in.) beyond the limits of the plenum space." would prohibit all wiring methods used in plenum space from general use. It would prohibit raceway from being used anywhere except in a plenum space (with a 6 inch extension). It would also prohibit plenum cable from being used anywhere except in a plenum (with a 6 inch extension). Consequently, to wire a telephone from a terminal room to an office could require non-plenum cable to be used up to the plenum, a splice to plenum cable for traversing the plenum, and then another splice to reach an outlet. This provision of the proposal conflicts with the provisions for the use of raceway in Chapter 3 and the substitutions of plenum cable for other lower-fire-rated cables permitted in Articles 725 and 760.

The Panel recommends that the TCC forward this proposal to the Air Conditioning Committee for comment.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-90 Log #1728 NEC-P03 **Final Action: Reject**
(300-22)

TCC Action:

See Technical Correlating Committee Note on Proposal 3-89.

Submitter: Marcelo M. Hirschler, GBH International / Rep. Fire Retardant Chemicals Association, Plenum Cable Association and Vinyl Institute EOTS

Recommendation:

Revise text to read as follows:

300.22 Wiring in Ducts, Plenums, and Other Air-Handling Spaces. The provisions of this section apply to the installation and uses of electric wiring and equipment in ducts, plenums, and other air-handling spaces.

FPN: See Article 424, Part VI, for duct heaters.

300.22.1~~(A)~~ Ducts for Dust, Loose Stock, or Vapor Removal. No wiring systems of any type shall be installed in ducts used to transport dust, loose stock, or flammable vapors. No wiring system of any type shall be installed in any duct, or shaft containing only such ducts, used for vapor removal or for ventilation of commercial-type cooking equipment.

300.22.2~~(B)~~ Ducts or Other Spaces ~~Plenums~~ Used for Environmental Air (Other than Plenums, Including Ceiling Cavity Plenums and Raised Floor Plenums). Only wiring methods consisting of Type MI cable, Type MC cable employing a smooth or corrugated impervious metal sheath without an overall nonmetallic covering, electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, or rigid metal conduit without an overall nonmetallic covering shall be installed in ducts or ~~plenums~~ other spaces specifically fabricated to transport environmental air (other than ceiling cavity plenums and raised floor plenums). Flexible metal conduit and liquidtight flexible metal conduit shall be permitted, in lengths not to exceed 1.2 m (4 ft), to connect physically adjustable equipment and devices permitted to be in these ducts and plenum chambers. The connectors used with flexible metal conduit shall effectively close any openings in the connection. Equipment and devices shall be permitted within such ducts or plenum chambers only if necessary for their direct action upon, or sensing of, the contained air. Where equipment or devices are installed and illumination is necessary to facilitate maintenance and repair, enclosed gasketed-type luminaires (fixtures) shall be permitted. Wiring methods installed in a plenum space shall be permitted to extend not more than 150 mm (6 in.) beyond the limits of the plenum space.

300.22.3 Plenums, Including Ceiling Cavity Plenums and Raised Floor Plenums . This section applies to plenums, including ceiling cavity plenums and raised floor plenums, used for environmental air-handling purposes, but not to the spaces specified in 300.22.1 nor in 300.22.2. Wiring methods installed in these plenum spaces shall be permitted to extend not more than 150 mm (6 in.) beyond the limits of the plenum space. The wiring methods to be used for these plenum spaces are specified in 300.22.3.1. The electrical equipment to be used for these plenum spaces is specified in 300.22.3.2. This section does not apply to the spaces described in 300.22.3.4 or in 300.22.3.4.

300.22.3.1 Wiring Methods. The wiring methods for the plenum spaces specified in section 300.22.3 shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor communications, control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables and conductors shall be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers.

300.22.3.2 Equipment. Electrical equipment with a metal enclosure, or with a nonmetallic enclosure listed for the use and having adequate fire-resistant and low-smoke-producing characteristics, and associated wiring material suitable for the ambient temperature shall be permitted to be installed in the plenum spaces specified in section 300.22.3 unless prohibited elsewhere in this Code.

Exception: Integral fan systems shall be permitted where specifically identified for such use.

300.22.3.3 habitable rooms or areas of buildings, the prime purpose of which is not air handling.

300.22.3.4 joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.

300.22.4 Raised Floor Plenums for Information Technology Equipment. Electric wiring in raised floor plenums for information technology equipment shall be permitted in accordance with Article 645. Wiring methods installed in the raised floor plenum space shall be permitted to extend not more than 150 mm (6 in.) beyond the limits of the plenum space.

~~(C) Other Space Used for Environmental Air. This section applies to space used for environmental air-handling purposes other than ducts and plenums as specified in 300.22(A) and (B). It does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.~~

~~FPN: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.~~

~~Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.~~

~~(1) Wiring Methods. The wiring methods for such other space shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables and conductors shall be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers.~~

~~(2) Equipment. Electrical equipment with a metal enclosure, or with a nonmetallic enclosure listed for the use and having adequate fire-resistant and low-smoke-producing characteristics, and associated wiring material suitable for the ambient temperature shall be permitted to be installed in such other space unless prohibited elsewhere in this Code.~~

~~Exception: Integral fan systems shall be permitted where specifically identified for such use.~~

~~(D) Information Technology Equipment. Electric wiring in air-handling areas beneath raised floors for information technology equipment shall be permitted in accordance with Article 645.~~

Substantiation:

This proposal does three things:

1. It accomplishes the intent of the proposals prepared by the Technical Committee on Air Conditioning and submitted by its chairman,

Jeffrey Mattern, which is to clarify the language of the section and distinguish between the three types of spaces discussed in 300.22. Those spaces are: (A) Ducts for Dust, Loose Stock, or Vapor Removal (where no wiring systems of any kind are to be installed); (B) Ducts or Other Spaces Used for Environmental Air (where all wiring systems are to be enclosed in metal raceways), (C) Plenums (Including Ceiling Cavity Plenums and Raised Floor Plenums) (where wiring systems are to be listed for use in plenums, including plenum cables and raceways listed for the purpose) and (D) Raised Floor Plenums for Information Technology Equipment (which are actually a subset of the plenums described in 300.22(C)). With the proposed changes, the new language makes the distinctions clearer.

2. It clarifies that any product listed for a specific purpose can extend a little bit (up to 6 inches) outside of the space where it is installed. This is important, so installers don't have to change wiring system when they need to make a connection to equipment placed just outside a duct or plenum space. There are multiple examples in the NEC where materials are permitted to extend slightly beyond the original space, including the following: 110.26 (3), 210.52 (5) Exception, 300.50 (A) Exceptions 2 and 3, 426.22 (b), 520.42, 550.13 (G) (3), and Table 830.12. Moreover, the concept of using 6 inches as a small distance is used over 30 times in the NEC.

The proposed changes are consistent with the definition of "plenum" in both the NEC and NFPA 90A and the definitions of "ceiling cavity plenum" and "raised floor plenum" proposed by Jeffrey Mattern, chairman of the Technical Committee on Air Conditioning, responsible for NFPA 90A. The organizations making this proposal support the proposals made by Jeffrey Mattern.

"Plenum. A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system."

"Plenum, ceiling cavity. The space between the top of the finished ceiling and the underside of the floor or roof above where used to supply air to the occupied area, or to return or exhaust from the occupied area."

"Plenum, raised floor. The space between the top of the finished floor and the underside of a raised floor where used to supply air to the occupied area, or to return or exhaust air from or from the occupied area."

See also the statement and statistics related to fires in concealed spaces that are being provided in proposals associated with articles 725, 760, 770, 800, 820 and 830.

3. It adds "communications cables" to "control and power cables" as cables that can be listed specifically for use in plenum spaces. This was always understood but is being made explicit.

The three organizations represented in this proposal are submitting this proposal jointly as a single submission to avoid repetition at NFPA, per earlier instructions of NFPA staff. This joint submission is not intended to waive the ability of any of the groups to file separate proposals or comments in the future.

Panel Meeting Action: Reject

Panel Statement:

See panel statement on Proposal 3-89.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-91 Log #299 NEC-P03 (300-22(B)) **Final Action: Reject**

Submitter: Ellen Mannion, Elegant Electric

Recommendation:

Revise text to read as follows:

Only wiring methods consisting of Type MI cable, Type MC cable employing a smooth or corrugated impervious metal sheath without a ~~an overall~~ nonmetallic covering, electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, or rigid metal conduit without a ~~an overall~~ nonmetallic covering shall be installed in plenums or ducts specifically fabricated to transport environmental air.

Substantiation:

The existing statement is unclear. If the nonmetallic coverings are removed in the duct or plenum area will the installation be acceptable? If the nonmetallic coverings are removed in some other area, the coverings will no longer be "overall" the statement indicates that this might also be acceptable.

Panel Meeting Action: Reject

Panel Statement:

MC cable and rigid metal conduit can be manufactured with or without a nonmetallic covering over the outside of the cable or conduit. Where a nonmetallic covering is installed on either product, this nonmetallic covering is not designed to be removed from the outside of the cable or a conduit, unless the conduit must be cut and then threaded. The nonmetallic coating on rigid metal conduit has not been evaluated for use in plenums, ducts, or other spaces for environmental air. The nonmetallic coating on MC cable may or may not have been tested in accordance with UL 1685, the Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. In either case, the nonmetallic coating is on the outside over the entire cable or conduit.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-92 Log #1220a NEC-P03 (300-22(B)) **Final Action: Reject**

TCC Action:

See Technical Correlating Committee Note on Proposal 3-89.

Submitter: Richard Fransen, Daiken America, Inc. / Rep. Cable Fire Research Association

Recommendation:

Revise Section 300.22(B):

B) Ducts or Plenums (Other Than Ceiling Cavity and Raised Floor Plenums) Used for Environmental Air. Only wiring methods consisting of Type MI cable, Type MC cable employing a smooth or corrugated impervious metal sheath without an overall nonmetallic covering. Type EMT, electrical metallic tubing, flexible metallic tubing, Type IMC, intermediate metal conduit, or Type RMC, rigid metal conduit without an overall nonmetallic covering shall be installed in ducts or plenums specifically fabricated to transport environmental air. Type LFMC, flexible metal conduit and Type LFMCD, liquidtight flexible metal conduit for air ducts, shall be permitted in lengths not to exceed 1.2 m (4 ft), to connect physically adjustable equipment and devices permitted to be in these ducts and plenum chambers. The connectors used with flexible metal conduit shall effectively close any openings in the connection. Equipment and devices shall be permitted within such ducts or plenum chambers only if necessary for their direct action upon, or sensing of, the contained air. Where equipment or devices are installed and illumination is necessary to facilitate maintenance and repair, enclosed gasketed-type luminaires (fixtures) shall be permitted.

Substantiation:

This proposal is being offered as an alternate to the proposal from the Technical Committee on Air Conditioning that proposed to eliminate the use of liquidtight flexible metal conduit in ducts and plenums, other than ceiling cavity plenums and raised floor plenums, b because of a conflict with NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems. this proposal would establish listing requirements for limited fire hazard liquidtight flexible metal conduit and permit its use in Section 300.22(B) in place of combustible liquidtight flexible metal conduit and thereby comply with NFPA 90A by meeting the requirements for supplementary materials in air ducts. NFPA 90A requires that supplementary materials for air distribution systems have a maximum flame spread index of 25 and a maximum smoke developed index of 50.

The proposed requirements for limited fire hazard raceway meet the requirements of NFPA 90A for use in ceiling cavity plenums and raised floor plenums and exceed the requirements for supplementary materials in ducts. If the requirements were set to the minimum required for supplementary materials, then the raceway would not be permitted in ceiling cavity plenums and raised floor plenums.

Panel Meeting Action: Reject

Panel Statement:

The insertion of the "liquidtight flexible metal conduit for ducts" as a wiring method was rejected since Article 350 does not recognize this conduit as an acceptable raceway. UL 360, the Standard for testing and listing liquidtight flexible metal conduit, does not have a testing or listing criteria for limited smoke liquidtight flexible metal conduit. A fact finding report should be established for this new product and submitted to Panel 8 as a proposal since Panel 8 has jurisdiction of Article 350 for liquidtight flexible metal conduit.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-93 Log #2735 NEC-P03 (300-22(B)) **Final Action: Accept**

Submitter: Melvin K. Sanders, TECo., Inc.

Recommendation:

Delete "...LTFMC..." from the second sentence.`

Substantiation:

This will complete the action started in the 2002 NEC cycle. It was recognized than that there was no limit on the multiple number of 6 ft lengths in "other" ducts or plenums, and there is a similar problem where manufactured ducts are used.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-94 Log #446 NEC-P03 **Final Action: Accept in Part**
(300-22(B)(c) & (d))

TCC Action:

See Technical Correlating Committee Note on Proposal 3-89.

Submitter: L. Jeffrey Mattern, FM Global

Recommendation:

Revise section 300.22(B), (C) & (D) as follows:

(B) Ducts or Plenums (Other than Ceiling Cavity and Raised Floor Plenums) Used for Environmental Air. Only wiring methods consisting of Type MI cable, Type MC cable employing a smooth or corrugated impervious metal sheath without an overall nonmetallic covering, electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, or rigid metal conduit without an overall nonmetallic covering shall be installed in ducts or plenums specifically fabricated to transport environmental air. Flexible metal conduit ~~and liquidtight flexible metal conduit~~ shall be permitted~~;~~ in lengths not to exceed 1.2 m (4 ft), to connect physically adjustable equipment and devices permitted to be in these ducts and plenum chambers. The connectors used with flexible metal conduit shall effectively close any openings in the connection. Equipment and devices shall be permitted within such ducts or plenum chambers only if necessary for their direct action upon, or sensing of, the contained air. Where equipment or devices are installed and illumination is necessary to facilitate maintenance and repair, enclosed gasketed-type luminaires (fixtures) shall be permitted.

(C) Other Space Used for Environmental Air. This section applies to space used for environmental air-handling purposes other than ducts and plenums as specified in 300.22(A) and (B). It includes ceiling cavity plenums and raised floor plenums. It does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.

~~FPN: The space over a hung ceiling used for environmental air handling purposes is an example of the type of other space to which this section applies.~~

Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.

(1) Wiring Methods. The wiring methods for such other space shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory assembled multiconductor control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables and conductors shall be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers.

FPN: See NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems, for information on materials permitted in ceiling cavity plenums and raised floor plenums.

(2) Equipment. Electrical equipment with a metal enclosure, or with a nonmetallic enclosure listed for the use and having adequate fire-resistant and low-smoke-producing characteristics, and associated wiring material suitable for the ambient temperature shall be permitted to be installed in such other space unless prohibited elsewhere in this Code.

Exception: Integral fan systems shall be permitted where specifically identified for such use.

(D) Information Technology Equipment. Electric wiring in ~~air handling areas~~ raised floor plenums ~~beneath raised floors~~ for information technology equipment shall be permitted in accordance with Article 645.

Substantiation:

The Technical Committee on Air Conditioning has reviewed the NEC with respect to wiring and cable methods used in ducts and plenums that move environmental air. The Technical Committee on Air Conditioning has been assigned the primary jurisdiction for the limitations of combustible materials used in air ducts and plenum spaces. This includes wire and cable, as well as nonmetallic raceway. This proposal is one of a series of proposals that are intended to better correlate the requirements in the NEC with NFPA 90A.

The current (1999) edition of NFPA 90A does not address the installation of wire and cable in air ducts and plenums other than ceiling cavity and raised floor plenums. The Air Conditioning Committee has completed processing proposals and comments for the 2002 edition; it also does not address the installation of wire and cable in air ducts and plenums other than ceiling cavity plenums and raised floor plenums. The Air Conditioning Committee will need to address the issue in the next revision cycle. The use of wire, cable and nonmetallic raceway in air ducts should be allowed on a very limited basis.

Combustible materials located in plenum spaces are limited as to their flammability and to the development of smoke under standard fire exposures. The purpose of the limitation is to reduce the risk of fire spreading within the concealed spaces that are used for the transportation of environmental air. Fires in these spaces can become extremely hazardous because they can be undetected due to the concealed nature of the space. Smoke can also be rapidly spread throughout the building from the air handling system.

This proposal uses the terms "ceiling cavity plenum" and "raised floor plenum" to improve correlation between the NEC and NFPA 90A. A separate proposal has been made to put the appropriate definitions in Article 100. The permission to use plenum cables in air ducts and plenums, other than ceiling cavity and raised floor plenums is proposed to be deleted to correlate with NFPA 90A.

Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Part

Accept the deletion of the phrase "and liquidtight flexible metal conduit" out of 300.22 (B) and reject the remainder of the Proposal.

Panel Statement:

The proposed fine print note is not needed for clarity. The concepts of "ceiling cavity plenums", "raised floor plenums" and other similar concepts were not accepted by CMP-3. Utilizing the suggested phrases "other than ceiling cavity and raised floor plenums" and "ceiling cavity plenums and raised floor plenums" provides an additional subdivision of the NEC phrase "other space used for environmental air" resulting in restriction of wiring methods within those areas that Panel 3 is not willing to accept without additional technical substantiation from the NFPA 90A Committee.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

EGESDAL: According to the Panel Statement, the proposal causes a "restriction of wiring methods." The Panel did not identify nor substantiate any restrictions. Without a detailed technical identification of the restrictions, the Technical Committee on Air

substantiate any restrictions. Without a detailed technical identification of the restrictions, the Technical Committee on Air Conditioning will have difficulty responding to the Panel's rejection.

The Panel Action to Reject Proposal 3-94 is inconsistent with the Panel Statement in Proposal 3-89. The last sentence of the Substantiation of Proposal 3-94 reads, "The permission to use plenum cables in air ducts and plenums, other than ceiling cavity and raised floor plenums is proposed to be deleted to correlate with NFPA 90A." The second paragraph in the Panel Statement in Proposal 3-89 reads, "The Air Conditioning Committee in NFPA 90A-2002, Standard for the Installation of Air Conditioning and Ventilating Systems, has specific requirements for cables installed in ceiling cavity plenums (4.3.10.2) and raised floor plenums (4.3.10.6). It also has requirements for supplementary materials installed in an air distribution system (4.3.3). Type CL2P, CL3P and FPLP cables listed in accordance with NFPA 262 do not meet the requirements for installation in the air distribution system, other than in ceiling cavity plenums and raised floor plenums. In the Panel Statement in Proposal 3-89, the Panel agrees with the substantiation in Proposal 3-94, yet rejected Proposal 3-94.

Similarly, the Panel Action and Panel Statement in Proposal 3-133 is inconsistent with the Panel Action on Proposal 3-94. The Panel Action and Panel Statement from 3-133 follows: The Panel Action revised Section 725.3(C) to read, "725.3(C) Ducts, Plenums, and Other Air-Handling Spaces. Class 1, Class 2, and Class 3 circuits installed in ducts, plenums, or other space used for environmental air shall comply with 300.22. Type CL2P or CL3P cables and plenum signaling raceways shall be permitted for Class 2 and Class 3 circuits installed in other spaces used for environmental air. Panel Statement: The change in the second sentence was made to clearly indicate that CL2P and CL3P, and plenum signaling raceways shall not be installed in ducts or plenums, but only in other spaces used for environmental air."

The Panel Statement in Proposal 3-89, and Panel Action and Statement in Proposal 3-133 indicates the Panel agrees with the changes proposed by the Air Conditioning Committee. Proposal 3-94 (and Proposals 3-132, 3-174, and 3-213) should be accepted.

Additional information for accepting Proposal 3-94 follows:

The Technical Committee on Air Conditioning is responsible for NFPA 90A, Standard for Installation of Air-Conditioning and Ventilating Systems. The Air Conditioning Committee has primary responsibility for combustibles in plenums, as assigned by the Standards Council. The A/C committee made a series of proposals to improve the correlation between the NEC and NFPA 90A-2002. The A/C committee submitted proposals to revise Sections in the following NEC Articles: 300, 725, 760, 770, 800, 820, and 830. The proposed changes to Section 300.22 serve as a basis for the proposed changes to the other Articles.

The Air Conditioning Committee's Proposal 3-94 for Section 300.22 is primarily editorial, except for the proposed (and accepted) deletion of liquidtight flexible metal conduit. The proposed change to 300.22(B) clarifies that the ducts and plenums exclude "ceiling cavity and raised floor plenums." The proposed change to Section 300.22(C) includes "ceiling cavity and raised floor plenums" in the requirements for "Other space used for environmental air." These proposed changes correlate with the terms (ceiling cavity plenum and raised floor plenum) described in NFPA 90A-2002. This correlation in terminology is important as NFPA 90A permits materials not associated with the air distribution system installed in ceiling cavity plenums and raised floor plenums. These permitted materials have specific listing and testing requirements. NFPA 90A makes no provision for unrestricted quantities of electrical wiring to be installed in air ducts and plenums, other than ceiling cavity plenums and raised floor plenums. The Chapter 7 and 8 Articles listed above permit unrestricted quantities of combustible cable to be installed in ducts, plenums and other space used for environmental, which is in conflict with NFPA 90A-2002. Both 300.22(B) and NFPA 90A-2002 strictly limit the materials permitted in fabricated ducts and plenums.

Panel 3 is responsible for Articles 300, 725, and 760. Accepting the proposals from the Air Conditioning committee provides correlation between the requirements of Section 300.22 and Articles 725 and 760, and with NFPA 90A-2002.

HORMAN: The proposal should be accepted. The concepts of "ceiling cavity plenums" and "raised floor plenums" with restriction of wiring methods within those areas should be accepted as proposed so the NEC will correlate more closely with NFPA 90A 2002 edition.

Comment on Affirmative:

AYER: I think that adding the additional words "ceiling cavity plenums and raised floor plenums" would add clarity to the code, but should be placed in the FPN of 300.22(C) rather than in the body of the text. This addition, will help delineate that these two types of plenums clearly reside in 300.22(C). It could be interpreted from reading 300.22 that a raised floor plenum could be wired only with metallic wiring methods since it is not mentioned in 300.22(C).

In addition there are many sections in Chapter 7 that state that plenum cables (i.e., CL2P, FPLP, etc.) can be installed in "Other spaces used for Environmental Air". By adding the additional wording to the FPN, the designer or installer will be better able to differentiate between 300.22(B) and (C).

KUMANDAN: The NFPA Technical Committee on Air Conditioning is responsible for the requirements that relate to safety to life and property from fire for air handling systems. The NFPA Standards Council has clearly established that the requirements for products and materials in air handling systems, including wire and cable, are under the jurisdiction of the NFPA Committee for Air Conditioning.

There were specific proposals that were submitted with the intent of correlating the NEC with the current edition of NFPA 90A with regard to wire and cable installed in ducts and plenums. It is a fundamental fire protection principle and practice to limit the flammability and smoke development of products and materials installed in air handling spaces. Smoke can spread quickly through the air handling system and can be recirculated throughout the entire structure, which can greatly affect safe evacuation of a building during a fire event. The quantity of smoke developed during fires is not trivial and the HVAC system could create a significant hazard if the smoke is conveyed through the HVAC system into areas of refuge and means of egress for the building.

The NFPA 90A Standard For the Installation of Air Conditioning and Ventilating Systems specifies that plenum rated cable is only for use in ceiling cavity plenums and raised floor plenums. The requirements in NFPA 90A for wire and cable installed in ducts or plenums other than ceiling cavity plenums and raised floor plenums are more stringent. Because ducts are small in area as compared to an air handling ceiling plenum, the more stringent requirements are justified. The concentration of smoke that results from a fire will be higher in the duct because of the smaller area. Other plenum spaces are considered more hazardous because of their proximity to air handling equipment. Smoke from fires that originate near the air handling equipment will be conveyed to other parts of the building faster than fires that are in the ceiling cavity or raised floor plenums.

Acceptance of the definitions presented by the Air Conditioning Committee would have eliminated the current differences in interpretation between the NEC and NFPA 90A related to wire and cable installed in ducts and other plenum spaces. CMP-16 accepted similar proposals during their ROP Meeting, and thus, there is a potential correlation issue between CMP-3 and CMP-16.

3-95 Log #1212 NEC-P03 **Final Action: Reject**
(300-22(D))

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
(D) ~~Information Technology Equipment.~~ Electrical Wiring in Air-Handling Areas Beneath Raised Floors
(1) Electrical wiring in air-handling areas beneath raised floors in ~~for I~~ information ~~(~~ Technology ~~e~~ Equipment Rooms shall comply with all of the requirements of ~~be permitted in accordance with~~ Article 645.
(FPN) Special requirements are found in 645.2 and NFPA 75-1999.
(2) Electrical wiring in air-handling areas beneath raised floors in other than "Information Technology Equipment Rooms" shall comply with the provisions of 300.22(C), "Other Space Used for Environmental Air".

Substantiation:

I believe this clarification is necessary for the safety of building occupants of the many buildings where there are office areas utilizing the raised floor concept. Most of these installations are not designed to comply with the requirements in Article 645 (645.2) or NFPA 75-1999. Some inspectors are having a difficult time classifying these installations. This language is to make it clear that these raised floor installations will have to comply with all of 645.2 or be wired in accordance with 300.22(C).
Note: Supporting Material is available for review at NFPA headquarters.

Panel Meeting Action: Reject

Panel Statement:

The existing text in Section 300.22(D) is permissive in nature to permit the user of the NEC to either install the system in accordance with all of the requirements in 300.22(C) using acceptable wiring methods per 300.22(C) or to use the requirements in Article 645, as an alternative which relaxes some of the more stringent requirements from 300.22(C). The proposal would require that all raised floor installations for information technology rooms to be installed in accordance with Article 645, even if the installer wanted to use the more stringent requirements found in 300.22(C). Section 645.1 FPN already references NFPA 75 so an additional reference in 300.22(D) is unnecessary since anyone using Article 645 would have access to the reference to NFPA 75.
Raised floors with air handling capabilities for general office areas are already clearly covered by 300.22(C).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

AYER: All subsections of 300.22 deal with areas which are used for Air-Handling Purposes. 300.22(A) is labeled "Ducts for Dust, Loose Stock, or Vapor Removal". 300.22(B) is labeled "Ducts for Plenums Used for Environmental Air". 300.22(C) deals with "Other spaces used for environmental air". 300.22(D) should be relabeled to fit the previous subsections.
This is part of what the submitter is trying to accomplish. However a better wording would be "Raised Floor Plenums in Information Technology Rooms". I agree with trying to change the title of the section but do not agree with the rest of the proposal.

3-96 Log #922 NEC-P03 **Final Action: Accept**
(300-34)

Submitter: Roger D. Wilson, The Austin Company

Recommendation:

The word "overall" should be inserted in the first sentence of section 300.34 as follows:
"The conductor ... or 12 times the overall diameter for shielded...".

Substantiation:

This important qualifier (the word "overall") is missing.
Disputes arise between field engineers and cable installers over the issue of bending radius for shielded, or lead-covered, conductors due to the omission of the word "overall" from the stated minimum allowable bending radius for these conductors in Section 300.34 of the NEC. Thus, installers argue that the wording is intended to allow for lesser bending radii (e.g., one based on the diameter of the copper portion of the conductor).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-97 Log #5 NEC-P03 **Final Action: Accept**
(300-37)

NOTE: The following proposal consists of Comment 3-57 on Proposal 3-102 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 3-102 was:
Revise to read as follows:
Aboveground Wiring Methods. Aboveground conductors shall be installed in rigid metal conduit, in intermediate metal conduit, in electrical metallic tubing, in rigid nonmetallic conduit, in auxiliary gutters, in cable trays, as busways, as cablebus, in other identified raceways, or as open runs of metal-clad cable suitable for the use and purpose. In locations accessible to qualified persons only, open runs of Type MV cable and bare conductors, including busbars, shall also be permitted where securely supported on insulators.

Submitter: Melvin K. Sanders, TECo., Inc.

Recommendation:

This proposal should be rejected for the reasons cited by Mr. Andrews.

Substantiation:

In addition to the rejection comments of Mr. Andrews, I have reviewed similar articles in the 1999 Edition and the 2002 Draft and they specifically include minimum wall thickness where higher voltages are concerned. None is included for auxiliary gutters.
In earlier editions, information on permitted wiring methods was covered by now deleted Article 710 and the referral in 300-2(a) (1999 Edition) to other articles allowed specific review by them. Now that this is in Article 300, this cross-check has been eliminated and until the panel having jurisdiction of particular wiring methods makes an evaluation, adding it to the shopping list here without such validation makes no sense. This should have been referred to Code-Making Panel 6, and if they agree sufficient safeguards are in place they can include it at that time and present wording of 300-2(a) would be adequate.
The present wording of 300-2(a) does not prohibit wiring methods - it merely guides the reader to the appropriate article of concern. I see this as a backdoor attempt to accept wiring methods that rightfully are the responsibility of the individual panels where the expertise to make such decisions resides.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

3-98 Log #98 NEC-P03 **Final Action: Accept**
(300-37)

Submitter: James M. Daly, General Cable

Recommendation:

Change "...open runs..." to "...exposed runs..." in two places."

Substantiation:

This is one of a series of proposals to provide consistency throughout the code in the use of the terms "exposed", "open wiring", and "open runs" as applied to wiring methods.
"Exposed" is used 306 times throughout the code, "open runs" is used 7 times, and "open wiring" is used 29 times but only 10 of those instances do not refer to "open wiring on insulators".
Exposed is defined in Article 100 as shown below.
"Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated or insulated."
"Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access."
Open wiring on insulators is defined in 398.2 as "An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings."
"Open runs" is not defined in the code.
This series of proposals will limit the term "open wiring" to open wiring on insulators (Article 398) and have the term "exposed" apply to "open runs" and open wiring not on insulators.
Wire and cable that must be continuously supported and protected will be specifically addressed in the applicable section.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

3-99 Log #99 NEC-P03 **Final Action: Accept in Principle**
(300-39)

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
300.39 Braid-Covered Insulated Conductors — Open Wiring on Insulators ~~Installation. Open runs of braid-covered insulated conductors.~~ Braid-covered insulated conductors used in open wiring on insulators shall have a flame-retardant braid.

Substantiation:

This is one of a series of proposals to provide consistency throughout the code in the use of the terms "exposed", "open wiring", and "open runs" as applied to wiring methods.
"Exposed" is used 306 times throughout the code, "open runs" is used 7 times, and "open wiring" is used 29 times but only 10 of those instances do not refer to "open wiring on insulators".
Exposed is defined in Article 100 as shown below.
"Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated or insulated."
"Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access."
Open wiring on insulators is defined in 398.2 as "An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings."
"Open runs" is not defined in the code.
This series of proposals will limit the term "open wiring" to open wiring on insulators (Article 398) and have the term "exposed" apply to "open runs" and open wiring not on insulators.
Wire and cable that must be continuously supported and protected will be specifically addressed in the applicable section.

Panel Meeting Action: Accept in Principle

Change "Open Installation" in the title to "Exposed Installation" and "Open runs" in the first sentence to "Exposed runs" to read as follows:
"300.39 Braid-Covered Insulated Conductors - ~~Open~~Exposed Installation.
~~Open~~ Exposed runs of braid-covered insulated conductors shall have a flame-retardant braid. If the conductors…." The remainder of the existing NEC text is unchanged.

Panel Statement:

The term "open installations" and "open runs" is more appropriately covered using the word "exposed" since the reason for the requirement is to ensure a flame-retardant braid be installed where this wiring method is employed as an exposed installation. Open wiring on insulators, as covered in Article 398, is permitted only for industrial and agricultural installations where installed on or in buildings and is only for 600 volt and less installations. Braid-covered insulated conductors could be installed in a cable tray and other similar installations so restricting this wiring method to only Open Wiring on Insulators is overly restrictive.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-100 Log #6 NEC-P03 (300-50) **Final Action: Accept in Principle**

NOTE: The following proposal consists of Comment 3-59 on Proposal 3-109 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 3-109 was:
Revise Table 300-50 as shown. (Leave the present text located above and below the table as in the 1999 Edition of the NEC.)

*****INSERT Table 300-50 HERE*****
(Table shown on page 2699)

Submitter: Dann Strube Lanesville, IN

Recommendation:

The panel needs to reconsider several parts of the proposed table. Differences between this table and the 300-5 table need to be addressed.

Substantiation:

Column (7) depth on Table 300-50 is zero inches while at less than 600 volts a depth of 4 in. is required. Depth for 15 KV should not be less than that required for 480 volt systems under the same conditions.

Section 300-50 Exception No. 2 allows reduction of depth with concrete cover. Section 300-5 has no such provision. Safe at 15 KV is safe at 480 V.

Please note that I did not recommend a specific way to revise the items. It is not important to me which way code-making panel 3 fixes this problem, only that the rules agree.

The third issue to consider is airport runway depth. The exception allowing cable to be at 18 in. while other methods did not change is documented in the TCR for the 1974 NEC (published 1975) as proposal 7 for Panel 8. The exception, seen as 300-50 Exception No. 6, 1999 NEC, appeared in 300-5 for less than 600 V as well as Article 710 for higher voltages. The table now found in 300-5 was introduced in 1990. The exception in question went away and the 18 in. rule appeared. There was no substantiation for the change in depth requirements at that time.

I am not really opposed to the 18 in. depth at the runway but I do urge the panel to consider the need for greater depth for raceways. First the FAA Memphis office told me that their Advisory Circular 150/5370-108 specifies 18 in. for all methods in these locations. I was also told that this is advisory only and they do not demand 18 in. in some cases.

I have a background in air traffic control and can say from experience that an aircraft off the runway does alot of damage. Runway lights, taxiway lights, distance marker signs and lights, etc. are damaged. Considering the amount of above ground damage that can occur, I question the need to provide extra protection for an underground conduit.

Panel Meeting Action: Accept in Principle

Panel Statement:

See the Panel Action and Panel Statement on Proposal 3-101, which addresses the submitter's concerns. The depth for Column 7 of 4 inches is now the same for both tables. The reduction in depth for each 2 inches of concrete has been deleted in Table 300.50. The 18-inch depth rule for both tables is now consistent. There was no substantiation submitted to warrant a greater burial depth.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-101 Log #7 NEC-P03 **Final Action: Accept in Principle**
(Table 300-50)

NOTE: The following proposal consists of Comment 3-61 on Proposal 3-109 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. [See Proposal 3- (Log #6)]

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation:

Replace the accepted table with the suggested version, with four notes, as follows:

Insert Table NEC TB Log 7 Rec here

(Table shown on page 2700)

Substantiation:

The table eliminates all exceptions without making unsubstantiated changes in the technical requirements. The panel action raised conduits under slabs to the surface of the slabs, eliminated cables from the runway allowance, failed to account for the 2-in. concrete-in-the-trench exception, and didn't incorporate the warning ribbon requirement. The panel action also made column headers that are far too complicated to be usable as such. This comment solves that problem with a note, only enumerates columns with substantive requirements, similar to Table 300-5, and it also incorporates the Technical Correlating Committee objection to the cover definition being in the title.

Panel Meeting Action: Accept in Principle

Replace superscript numbers below the table in the proposal with regular numbers similar to the Notes in Table 300.5.

Replace Note 2 in the proposal with a new Note 2 composed of text from old Exception No. 4 to read as follows:

2. Lesser depths shall be permitted where cables and conductors rise for terminations or splices or where access is otherwise required.

Delete the superscript number 2 in Column No. 1 and 2 in the Table.

Add a new Note 5 to read as follows:

5. Where solid rock prevents compliance with the cover depths specified in this table, the wiring shall be installed in a metal or nonmetallic raceway permitted for direct burial. The raceways shall be covered by a minimum of 50 mm (2 in.) of concrete extending down to rock.

Panel Statement:

Note 2 from the proposal or the old Exception No 2 was deleted since this reduction of 6 inches for each 2 inches of concrete placed on top of the wiring method was not permitted for 600 volt and less installations. There isn't an increased hazard involved for 600 volt and less installations so there wasn't a valid reason for the discrepancy between the two Tables.

The new Note 2 was inserted to provide permission to bring the installation up to grade for terminations, splicing, or for access. This was previously located in Exception No. 4.

New Note 5 was added to provide an alternative where solid rock is encountered. This note is also located in Table 300.5 and the existing Exception No. 6 for Table 300.50 so again it provides consistency with the existing text.

The superscript numbers were changed in the Notes to full sized numbers to be consistent with Table 300.5.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

SANDERS: Accept in Principle with an affirmative comment the proposed revisions to Table 300.50 for circuits rated greater than 600 volt and the accompanying notes in order to more closely correlate with Table 300.5 for circuits rated 600 volt or less.

However, this Accept in Principle caused the deletion of the present Table 300.50 Exception No. 2. This will remove permission for direct buried cables to have reduced burial depths of 150 mm (6 in.) for each 50 mm (2 in.) of concrete or equivalent protection.

There was no technical substantiation other than the vague desire to correlate where possible, with the further misunderstanding the present language that higher voltage circuits were being held to a lesser standard than 600 volt or less.

This deletion would require the more prevalent industrial application of over 0.6 kV to 22 kV to be required to have all cables remain at 750 mm (30 in.) burial depth no matter what the installation circumstances, while the 600 volt direct buried cables could rise to 450 mm (18 in.) from 600 mm (24 in.) when under 50 mm (2 in.) concrete protection.

Under the present and earlier text of 2002 NEC, the over 600 volt cables could rise 150 mm (6 in.) for each 50 mm (2 in.) of concrete, and to rise to the 18 in. depth that 600 volt cables can achieve with a 2 in. concrete cover, over 600 volt circuits would need to have [(30 - 18)/ 6 x 2] = 4 in. concrete cover.

The present text requires twice as much physical protection than the lower voltage cable burial depth where both are allowed to rise to an 450 mm (18 in.) depth, as is logical. This illustrates that higher voltages are not presently allowed to be installed to a lesser standard than lower voltage cables.

3-102 Log #2997 NEC-P03 **Final Action: Reject**
(Table 300-50)

Submitter: Goran Haag, Champion Fiberglass, Inc.

Recommendation:

For Column 3, add: "Extra Heavy Wall RTRC" (i.e. the heading would read: Rigid Metal Conduit, Intermediate Metal Conduit and Extra Heavy Wall RTRC").

Substantiation:

RTRC with Extra Heavy Wall has strengths exceeding Intermediate Metal Conduit. RTRC with Extra Heavy Wall is now listed by UL.

Panel Meeting Action: Reject

Panel Statement:

The submitter must provide the pertinent listing information permitting this raceway system to be installed in a location subject to physical damage. The information in the 2002 UL White Book states as follows:
Reinforced thermosetting resin conduit marked "Above Ground" or "AG" has been evaluated for use aboveground, underground and for direct burial with or without encasement in concrete. This conduit has been evaluated for concealed or exposed work where not subject to physical damage.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-103 Log #3074 NEC-P03 **Final Action: Accept**
(Table 300-50)

Submitter: Wally Harris, Atlantic Inland Inspections

Recommendation:

Place lines in Table as indicated to facilitate ease of use.

Insert Table 300.50 Here

(Table shown on page 2700)

Substantiation:

This proposed format will help users, by making the Table more "user friendly" to a reader's eyes.

Panel Meeting Action: Accept

Panel Statement:

See the Panel Action on Proposal 3-101 where lines were placed in the table to ensure user-friendliness.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-104 Log #8 NEC-P03 **Final Action: Accept in Principle**
(300-50(A) and Table 300-50)

NOTE: The following proposal consists of Comment 3-62 on Proposal 3-109 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. [See Proposal 3- (Log #6)]

Submitter: Melvin K. Sanders, TECo., Inc.

Recommendation:

Revise Section 300.50(A) Exceptions and Table 300-50 as shown:

INSERT TABLE 300-50 HERE

(Table shown on page 2701)

Substantiation:

To be consistent with Table 300-5, and acknowledge burial depths for airport locations are to be 18 inches (457.2 mm) minimum due to FAA regulations.

Panel Meeting Action: Accept in Principle

Panel Statement:

See the Panel Action on Proposal 3-101, which incorporates all of the exceptions into a Table with Notes.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-105 Log #1227 NEC-P03 **Final Action: Accept**
(300-50(D))

Submitter: Melanie Roberts, Belco Electric

Recommendation:

Revise text to read as follows:
Backfill containing large rocks, paving materials, cinders, large or sharply angular substances, or corrosive materials shall not be placed in an excavation where materials can damage or contribute to the corrosion of raceways, cables, or other substructures or where it may prevent adequate compaction of fill. ~~, or contribute to corrosion of raceways, cables or other substructures.~~

Substantiation:

Excessive wordiness increases the difficulty level when reading the NEC. The rewording above makes the statement more concise and easier to understand. There is no need to repeat the words, "raceways, cables, or other substructures.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

6-5 Log #2201 NEC-P06 **Final Action: Reject**
(310-2)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
310.2 Conductors.
(A) Insulated. Conductors shall be insulated.
Exception: Where covered or bare conductors are specifically permitted elsewhere in this Code.
FPN: See 250.184 for insulation of neutral conductors of a solidly ~~grounded~~ earthed high-voltage system.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

"Grounded" has been universally accepted within the NEC for many years and changing to "earthed" will not enhance the clarity of the Code.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-6 Log #234 NEC-P06 **Final Action: Reject**
(310-4)

Submitter: Jerry Richardson, TFE, Inc.

Recommendation:

Revise text as follows:
310-4 Conductors in Parallel. Aluminum, copper-clad aluminum, or coper conductors of size 1/0 AWG and larger, comprising each phase, neutral, or grounded circuit conductor, shall be permitted to be connected in parallel (electrically joined at both ends to form a single conductor).
~~Exception No. 1: As permitted in Section 620-12(a)(1).~~
Exception ~~No. 2~~: Conductors in sizes smaller than No. 1/0.

Substantiation:

Exception No. 1 refers to a part of the code which does not exist. There is no "Section 620-12(a)(1)."

Panel Meeting Action: Reject

Panel Statement:

Section 620.12(A)(1) is contained in the 2002 Code. The section numbering was revised from the 1999 Code where 620-12(a)(1) did exist.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-7 Log #731 NEC-P06 **Final Action: Accept in Part**
(310-4)

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text to read as follows:

Conductors in Parallel. Aluminum, copper-clad aluminum, or copper conductors ~~of size 1/0 and larger~~ comprising each phase, polarity, neutral, or grounded circuit conductor shall be permitted to be connected in parallel (electrically joined at both ends to form a single conductor) only where such conductors are size 1/0 or larger.

Exception No. 1 No change.

Exception No. 2 No change.

Exception No. 3 No change.

Exception No. 4: Under engineering supervision, grounded neutral conductors in sizes 2 AWG and 1 AWG ~~larger~~ shall be permitted to be run in parallel ~~for~~ with existing installations of a 3-phase 4-wire wye-connected circuit where overheating of the existing neutral occurs due to high content of triplen currents.

FPN: delete

The paralleled conductors of each phase, polarity, or grounded conductor shall

(1) No change

(2) No change

(3) No change

(4) No change

(5) No change

Where run in separate raceways or cables, the raceways or cables shall have the same physical characteristics. Conductors of one phase, polarity, neutral, or grounded circuit conductor shall not be required to have the same physical characteristics as those of another phase, polarity, neutral or grounded circuit conductor to achieve balance. (remainder unchanged).

Substantiation:

The wording of this permissive rule only infers that conductors smaller than 1/0 shall not be paralleled but there is no specific prohibition against that, and exceptions usually modify a mandatory rule.

Addition of the word "polarity" will clarify that dc circuits are included; the word "phase" is commonly associated with only ac circuits.

It is my understanding that Example No. 4 was intended for the purpose suggested in the FPN which condition may occur in 3-phase 4-wire wye-connected circuits. However, the wording allows application to single-phase and direct-current circuits. An existing 3-wire single-phase set of ungrounded phase conductors with a 2 AWG neutral may be paralleled under engineering supervision even if there is no cogent reason to permit a grounded neutral smaller than 1/0 to be paralleled.

Since the exception is not restricted to conditions of high harmonic currents, why is engineering supervision required?

The "and larger" in Exception No. 4 in reality means 1 AWG since conductors larger than that are already permitted in the first paragraph and need no exception.

Panel Meeting Action: Accept in Part

The panel Accepts the addition of the word "polarity" in 4 locations, and Rejects the remainder of the proposal.

Panel Statement:

The change recommended to the first paragraph does not improve clarity.

Acceptance of the revised text to Exception No. 4 would limit paralleled conductors, except when used for harmonic currents. It was never the intent of the Panel to limit this Exception to only 3-phase 4-wire wye connected systems. As a result of these actions, the Fine Print Note needs to remain.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-8 Log #2202 NEC-P06 **Final Action: Reject**
(310-4)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:

310.4 Conductors in Parallel. Aluminum, copper-clad aluminum, or copper conductors of size 1/0 AWG and larger, comprising each phase, neutral, or ~~grounded~~ earth circuit conductor, shall be permitted to be connected in parallel (electrically joined at both ends to form a single conductor).

Exception No. 1: As permitted in 620.12(A)(1).

Exception No. 2: Conductors in sizes smaller than 1/0 AWG shall be permitted to be run in parallel to supply control power to indicating instruments, contactors, relays, solenoids, and similar control devices provided

(a) They are contained within the same raceway or cable,

(b) The ampacity of each individual conductor is sufficient to carry the entire load current shared by the parallel conductors, and

(c) The overcurrent protection is such that the ampacity of each individual conductor will not be exceeded if one or more of the parallel conductors become inadvertently disconnected.

Exception No. 3: Conductors in sizes smaller than 1/0 AWG shall be permitted to be run in parallel for frequencies of 360 Hz and higher where conditions (a), (b), and (c) of Exception No. 2 are met.

Exception No. 4: Under engineering supervision, ~~grounded~~ earth neutral conductors in sizes 2 AWG and larger shall be permitted to be run in parallel for existing installations.

FPN: Exception No. 4 can be used to alleviate overheating of neutral conductors in existing installations due to high content of triplen harmonic currents.

The paralleled conductors in each phase, neutral, or ~~grounded~~ earth circuit conductor shall

(1) Be the same length

(2) Have the same conductor material

(3) Be the same size in circular mil area

(4) Have the same insulation type

(5) Be terminated in the same manner

Where run in separate raceways or cables, the raceways or cables shall have the same physical characteristics. Conductors of one phase, neutral, or ~~grounded~~ earth circuit conductor shall not be required to have the same physical characteristics as those of another phase, neutral, or ~~grounded~~ earth circuit conductor to achieve balance.

FPN: Differences in inductive reactance and unequal division of current can be minimized by choice of materials, methods of construction, and orientation of conductors.

Where equipment grounding conductors are used with conductors in parallel, they shall comply with the requirements of this section except that they shall be sized in accordance with 250.122. Conductors installed in parallel shall comply with the provisions of 310.15(B)(2)(a).

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.

I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.

The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.

I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-5.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-6a Log #CP600 NEC-P06 **Final Action: Accept**
(310-4)

Submitter: Code-Making Panel 6

Recommendation:

At the end of the existing first paragraph of 310.4, delete "(electrically joined at both ends to form a single conductor)".

Substantiation:

The parenthetical phrase does not provide clarity and is not necessary.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-9 Log #3455 NEC-P06 **Final Action: Reject**
(310-4 Exception No. 4)

Submitter: Charles M. Trout, Maron Electric Co. Inc.

Recommendation:

Delete this exception in its entirety.

Substantiation:

The National Electrical Code is prescriptive code. To say "where the conditions of maintenance and supervision ensure that only qualified persons service the installation," is a performance requirement. Without prescriptive requirements indicating whether this qualified person is an employee of the owner of the premises or is a separately contracted person and the Authority Having Jurisdiction has a means of verification of the continued employment of the qualified person and whether the qualified person has been verified by the authority having jurisdiction as meeting the definition of a qualified person as shown in the definitions of this Code no prescriptive requirements have been followed.

To permit relaxation of the safety requirements of this Code without establishing a positive guarantee that the safety of persons and property is indisputably assured is a reprehensible act.

Panel Meeting Action: Reject

Panel Statement:

The text specified in the submitter's substantiation does not appear in 310.4, Exception No. 4.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-10 Log #2387 NEC-P06 **Final Action: Reject**
(310-4(6) (New))

Submitter: Ronald Bethea, Shelby County Code Enforcement

Recommendation:

Add a new list item No. 6 to 310.4 for parallel conductors as follows:
(6) Have the same ampacity.

Substantiation:

310.4(1) through (5) does not require conductors to have the same ampacity. This can result in conductors with different ampacities comprising the same phase or neutral when applying the derating factors of 310.15(b)(2).

An example of this would be an 800 amp three-phase, four-wire feeder comprised of three 300 Kcmil THWN-2 conductors per phase installed in two four inch rigid nonmetallic conduits. Two sets of conductors are installed in raceway "A" and the other set of conductors are installed in raceway "B". When the ampacity of these conductors are adjusted in accordance with 310.15(b)(2), assuming the grounded conductors are noncurrent carrying conductors, the two conductors per phase in raceway "A" will have an ampacity of 256 amps each while the conductors in raceway "B" have an ampacity of 285 amps.

The installation described above will result in the cables having different impedences and may cause unequal division of current. This proposal clarifies that conductors installed in parallel are required to have the same ampacity.

Panel Meeting Action: Reject

Panel Statement:

Adding list item (6) is redundant since list items (1) through (4) already cover the Submitter's concern.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-11 Log #2496 NEC-P06 **Final Action: Reject**
(310-5 Exception)

TCC Action:

The Technical Correlating Committee directs that this Proposal be referred to Code-Making Panel 15 for information relative to Proposal 15-72.

Submitter: Kevin C. Shultz, P.E., Walt Disney World Co.

Recommendation:

Add text to read as follows:
Exception No. 11 For control circuits of Permanent Amusement Attractions as permitted by 519.21.

Substantiation:

This proposal seeks to allow the use conductors smaller than 14 AWG in the control circuits of Permanent Amusement Attractions. Smaller conductors are required for connection to programmable electronic system components, micro devices, subminiature-D connectors, and LEDs as part of an integrated control system.

In a separate application, a new article (Article 519 Control Circuits for Permanent Amusement Attractions) is being proposed which describes the applicable materials and methods of wiring control circuits of a permanent amusement attraction where the conditions of maintenance and supervision ensure that qualified persons service the systems. The proposed article is a subset of, and is substantially based on the control circuit wiring methods of NFPA 79 and UL508A which reference and supports the use of conductors smaller than 14 AWG for integrated system control circuits. These methods and standards that have been used by the Amusement Attraction Industry. Utilizing wire sizes smaller than 14 AWG, when properly protected, is an appropriate method for integrated control systems in an permanent amusement attraction.

Panel Meeting Action: Reject

Panel Statement:

This Exception should be in Chapters 5 through 9. Section 90.3 stipulates that Chapters 1 through 4 apply generally. Chapters 5, 6, and 7 apply to special occupancies, special equipment, or other special conditions. These latter chapters supplement or modify the general rules. Chapters 1 through 4 apply except as amended by Chapters 5, 6, and 7 for the particular conditions. The new proposed Article 519 should include this exception.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-10a Log #CP601 NEC-P06 **Final Action: Accept**
(310-5 Exception)

Submitter: Code-Making Panel 6

Recommendation:

Revise the existing 310.5 to read as follows:
"Minimum Size of Conductors. The minimum size of conductors shall be as shown in Table 310.5, except as permitted elsewhere in the Code."
Also, delete all 10 Exceptions in existing 310.5.

Substantiation:

90.3 stipulates that "Chapters 1, 2, 3, and 4 apply generally; Chapters 5, 6, and 7 apply to special occupancies, special equipment, or other special conditions. These latter chapters supplement or modify the general rules. Chapters 1 through 4 apply except as amended by Chapters 5, 6, and 7 for the particular conditions."

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-12 Log #2122 NEC-P06 **Final Action: Accept**
(310-6)

TCC Action:

It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting. This action will be considered by the panel as a public comment.

Submitter: David Brender, Copper Development Assn. Inc.

Recommendation:

Revise 310.6 as follows:

310.6 Shielding. Solid dielectric insulated conductors operated above 2000 volts in permanent installations shall have ozone-resistant insulation and shall be shielded. All metallic insulation shields shall be grounded through an effective grounding path meeting the requirements of 250.4(A)(5) or 250.4(B)(4). Shielding shall be for the purpose of confining the voltage stresses to the insulation.

Exception: Nonshielded insulated conductors listed by a qualified testing laboratory shall be permitted for use up to 2400 ~~8000~~ volts under the following conditions:

(a) Conductors shall have insulation resistant to electric discharge and surface tracking, or the insulated conductor(s) shall be covered with a material resistant to ozone, electric discharge, and surface tracking.

(b) Where used in wet locations, the insulated conductor(s) shall have an overall nonmetallic jacket or a continuous metallic sheath.

(c) Where operated at 2400 ~~5001 to 8000~~ volts, the insulated conductor(s) shall have a nonmetallic jacket over the insulation. ~~The insulation shall have a specific inductive capacity not greater than 3.6, and the jacket shall have a specific inductive capacity not greater than 10 and not less than 6~~.

(d) Insulation and jacket thicknesses shall be in accordance with Table 310.63.

Substantiation:

This proposal is intended to enhance safety. Commercial specifiers have installed 5-kV to 8-kV cable without shielding because such construction is allowed by the NEC. Many cable manufacturers specifically recommend against nonshielded cable above 2-kV, but are hesitant to insist on shielding because of concern of having the customer source another supplier. However, several cable manufacturers have experienced arcing problems in customer installations where the cable conductors are separated outside of the outer sheath. These arcing instances are numerous, and present a possible safety hazard.

Note: See proposal for modifications to Table 310.63.

Also see photograph and letter from Southwire Company which I have provided.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 8 Negative: 3

Explanation of Negative:

KOMASSA: This proposal should be rejected. The submitter describes an isolated instance of a problem and has not provided adequate technical substantiation that the problems as described by the submitter is common through the industry. Many unshielded cables are installed and operating and the experience shows this is not a widespread problem.

LIGGETT: This proposal should have been rejected. Insufficient substantiation was provided to require this change. Although the change would correct the problems illustrated in the proposal documentation, different work practices in the installation would also fix the problem without limiting a widely used and accepted installation method. This change would create other installation problems in some cases. This proposal should be rejected until further study can be done to understand the implications of this change.

WETHERELL: I'm told that the 8 KV product is no longer produced, so eliminating it should not cause any problems. However, 5 KV nonshielded cable is still being produced and no problems have been brought to UL's attention. I believe that the panel should accept the proposal in principal and change "2400 volts" to "5000 volts" in the "exception", and delete the entire item "c" since it referred to the 8 KV product.

Comment on Affirmative:

ZIMNOCH: The panel action should have been to accept in part. The list item (c) under the exception should have been deleted in its entirety since that list item applied to 5001 to 8000 volts, which was deleted by the panel action on this proposal. If list item (c) remains, it will be in conflict with columns 2, 3, 12, and 13 of Table 310.63. List item (d) should then be renumbered as list item (c).

6-13 Log #2490 NEC-P06 **Final Action: Accept in Principle in Part**
(310-8(D))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
Insulated conductors and cables used where exposed to direct rays of the sun shall ~~be~~ comply with one of the following:
(1) ~~of a~~ Cables ~~type~~ listed for sunlight resistance
(2) ~~or~~ Conductors listed and marked "sunlight resistant".
(3) Covered with listed insulating material, such as tape or sleeving, that is identified as being sunlight resistant.

Substantiation:

The section was converted to a list to improve the readability. Covering insulated or covered conductors with UV resistant material can provide protection from the sun.

Panel Meeting Action: Accept in Principle in Part

The panel accepts the main text and list item (1) as submitted in the recommendation.
Revise list item (2) in the recommendation to read as follows:
"(2) Conductors listed and identified as being sunlight resistant."
Revise list item (3) in the recommendation to read as follows:
"(3) Insulated conductors covered with material, such as tape or sleeving, that is listed for the application and is identified as being sunlight resistant."

Panel Statement:

The revised wording addresses the intent of the submitter and provides greater clarity.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

EDWARDS: Proposed amendment to the CMP 6 revised Proposal 6-13:
310.8(D)
Insulated conductors and cables used where exposed to direct rays of the sun shall comply with one of the following:
(1) Cables listed for sunlight resistance,
(2) Conductors listed and identified as being sunlight resistant,
(3) Covered with listed insulating material, such as tape or sleeving, that is listed for the application and identified as being sunlight resistant.
Proposed amendment to paragraph (1).
Reword as follows:
(1) "Cables listed for sunlight resistance, together with their insulated conductors, also identified as being sunlight resistant, where exposed."
JUSTIFICATION: Insulated conductors, when exposed to sunlight, can be either a listed conductor (typically approved for use in raceways), or a component conductor of a finished cable. Either way, the exposure risk is the same. The component conductor of a finished cable has been ignored in the proposed amendment rewording this rule, although it might arguably have been included in the current 2002 code.

Comment on Affirmative:

WETHERELL: I agree with the proposal with the following suggested changes:
a) The words "or sleeving" should be removed from list item (3) since no listed sleeving exists that is rated for exposure to sunlight (weather).
b) Also in list item (3), change the end of the sentence to read "...identified as being "weather resistant", since that is the term used for such listed products.

6-14 Log #1137 NEC-P06 **Final Action: Reject**
(310-9)

Submitter: Ray C. Mullin, Ray C. Mullin / Rep. Ray C. Mullin Books

Recommendation:

Revise as follows:
310.9 Corrosive Conditions. Conductors exposed to oils, greases, vapors, gases, fumes, liquids, or other substances having a ~~deleterious~~ damaging effect on the conductor or insulation shall be of a type suitable for the application.

Substantiation:

The present section contains the word "deleterious." This word is totally confusing to the majority of electrical apprentices. Let's make the NEC easier for users by changing certain words to those understood by the majority of users.

Panel Meeting Action: Reject

Panel Statement:

The existing language is adequate. The word deleterious better describes the long-term damaging effects of the substances referenced.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-15 Log #2978 NEC-P06 **Final Action: Reject**
(310-10)

Submitter: Brannon Wiltse Tampa, FL

Recommendation:

Change existing text to:
310.10 Temperature Limitation of Conductors.
(A) Operating Temperature. No conductor shall be ... (wording is unchanged all the way through the end of the FPN)
(B) Short-Circuit Temperature. No conductor shall be used in such a manner that is short-circuit temperature exceeds the limit for the type of conductor involved. Conductor heating under short-circuit conditions is determined by (1) or (2):
(1) Short-Circuit Formula for Copper Conductors
$(I^2/A^2)t = 0.0297 \log_{10}(T_2 + 234)(T_1 + 234))$
(2) Short-Circuit Formula for Aluminum Conductors
$(I^2/A^2)t = 0.0125 \log_{10}(T_2 + 228)(T_1 + 228))$
where
I = short-circuit current in amperes
A = conductor area in circular mils
t = time of short-circuit in seconds
T_1 = initial conductor temperature in degrees Celsius
T_2 = final conductor temperatures in degrees Celsius
Copper conductor with paper, rubber, vanished cloth insulation $T_2 = 200$
Copper conductor with thermoplastic insulation $T_2 = 150$
Copper conductor with crosslinked polyethylene insulation $T_2 = 250$
Copper conductor with ethylene propylene rubber insulation $T_2 = 250$
Aluminum conductor with paper, rubber, varnished cloth insulation $T_2 = 200$
Aluminum conductor with thermoplastic insulation $T_2 = 150$
Aluminum conductor with crosslinked polyethylene insulation $T_2 = 250$
Aluminum conductor with ethylene propylene rubber insulation $T_2 = 250$

Substantiation:

There are numerous locations throughout the NEC that remind or require the user to apply conductors so that their short-circuit (temperature) ratings are not exceeded. These locations include 110.10, 240.1 FPN, 240.92(B)(1)(3), 240.92(D), 240.100(A), 240.100(C), 250.4(A)(5), 250.4(B)(4), and Table 250.122 Note. The physics formulas submitted with this proposal are the accepted basis for conductor short-circuit temperatures throughout the world. They are found in the ANSI/IEEE Red, Gray, Buff, and Blue Books and in the Canadian electrical Code. Similar versions of these formulas are found in IEC60204-1 (IEC Machinery Standard), SAE HS-1738 (Automotive Industry Machinery Standard), and IEC 60364-4-43 (IEC Installation Standard). The NEC is the only major installation guide throughout the world that does not supply its reader with these necessary physics formulas so that cables can be applied within their short-circuit (temperature) limitations. Let's catch up with the rest of the world and provide this information for the users of the NEC.

Panel Meeting Action: Reject

Panel Statement:

90.1(C) stipulates that "This Code is not intended as a design specification or an instruction manual for untrained persons."

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-16 Log #3506 NEC-P06 **Final Action: Reject**
(310-11(A)(6) (New))

Submitter: Leif O. Pihl Minneapolis, MN

Recommendation:

Add a new item (6) to 310.11 to read:
310.11 Marking
(A) Required information. All conductors and cables shall... (remains unchanged)
(1) through (5) (remain unchanged)
(6) Color of the insulation, as a full word or as an abbreviation.
Tracer color(s) shall follow the primary color, separated by a slash ('/') or an equivalent separation.
Exception No. 1: A conductor's tracer's color label is not required if the primary color is green and the tracer color is yellow.
Exception No. 2: A conductor's tracer's color label is not required if the tracer color is only black or only white.
FPN: Below are some examples of possible color labels, including the full name, a possible abbreviation, and an example primary color with a tracer color.
BLACK, [BLK], <BLK/ORG>,
WHITE, [WHT], <WHT/ORG>,
RED, [RED]. <RED/ORG>,
BLUE, [BLU], <BLU/ORG>,
GREEN, [GRN], <GRN/ORG>,
YELLOW, [YEL], <YEL/ORG>,
ORANGE, [ORG], <ORG/PRP>,
BROWN, [BRN], <BRN/ORG>,
PURPLE, [PRP], <PRP/ORG>,
PINK, [PNK], <PNK/ORG>,
GRAY, [GRY], <GRY/ORG>,
TAN, [TAN], <TAN/ORG>.

Substantiation:

Note: See also 2nd proposed change re revised text to section 310.11(B)(1). [i.e., Add two words: "...The color and AWG...".]
This change is being recommended to cut down on the number of hazards that have been introduced in the field due to misidentification of the color imbedded into conductors' insulation.
It has been stated that as few as 8-10%, and as many as one-in-six men have some form of color blindness. (Because the condition is hereditary by way of the X-chromosome, only 0.4-1.0% of women have the condition.) Within these groups of people, total color blindness is very rare, partial color blindness is much more common. People with partial color blindness are in "all walks of life", including electricians.
It does not take a color blindness condition in order to misidentify a conductor's insulation color. Numerous manufacturers have made colors that are not easy for even the most visually acute people to easily identify. Over time the colors in some conductor's insulation has been known to fade or discolor. Add into these situations problems with poor lighting, dust, and any other number of conditions, and one can see that color misidentification can cause serious safety problems. (Try identifying a green, gray and brown conductor, in a dusty, shady environment, when the manufacturer has not added sufficient pigment to the insulation.)
The ideal solution would be to dictate various ranges of color via existing RGB (red-green-blue), CMYK (Cyan-Magenta-Yellow-Black), frequency, or other identification methods. However, this is not an ideal world. Additional research would be needed in order to find out the exact colors that are less likely to be misidentified by the partially colorblind community. Further, manufacturers would object to additional manufacturing processes for cost and nuisance reasons.
There is a less expensive and arguably better alternative. Add to the already existing labeling requirements to include the color. This code change does not dictate what the exact color must be; the manufacturer gets to decide what color they choose to sell it as. With this code change they must label the conductor so that the end user has a better chance to know what the color is intended to be.
The reasons for the slash is to allow for tracer colors, which can cause similar problems.
The reason for Exception No. 1 is to ease the financial burden upon manufacturers and businesses that specialize in adding tracer colors and/or re-spooling conductors onto spools with a smaller quantity that the OEM made. This exception does not significantly reduce safety, as it is relatively rare for colors other than yellow to be placed on a green conductor.
The reason for Exception No. 2 is similar to Exception No. 1 as described above. So long as there is only one tracer color, and that color is either white or black, the chances of misidentification are very minimal.
The reason for the fine print note is to give manufacturers and users an example of what to expect the color labels could look like. These color choices are already in the market place. The selection of colors were derived from several manufacturers' catalogs. An example of what users should look for should improve proper identification, and thus safety.

Panel Meeting Action: Reject

Panel Statement:

310.11(A) Applies not only to both single conductors and multiconductor cables, but also to all voltages. The color of insulation and tracers could not be marked on the surface of multiconductor cables. In addition, alternative markings are available from manufacturers upon request.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-17 Log #3507 NEC-P06 **Final Action: Reject**
(310-11(B)(1))

Submitter: Leif O. Pihl Minneapolis, MN

Recommendation:

Revise as follows:
310.11(B)(1): Add two words: "... color and...".
Section to read as follows:
(B) Method of Marking.
(1) Surface Marking. The following conductors and cables shall be durably marked on the surface. The color and AWG size or circular mil area shall be repeated at intervals not exceeding 610 mm (24 in.)...

Substantiation:

Note: See also 1st proposed change re new text for section 310.11(A)(6). [i.e.: Labeling for the color of the insulation.)
This change is needed in order to pair up the color label with the AWG size label. Reasons why this improves safety are discussed in the accompanying proposal for 310.11(A)(6).

Panel Meeting Action: Reject

Panel Statement:

310.11(B)(1) Applies not only to both single conductors and multiconductor cables, but also to all voltages. The color of insulation and tracers could not be marked on the surface of multiconductor cables. In addition, alternative markings are available from manufacturers upon request.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-18 Log #130 NEC-P06 **Final Action: Reject**
(310-12)

Submitter: Alan H. Nadon, City of Elkhart, IN

Recommendation:

Add new text to read as follows:
310-12(*) (NEW) Grounding Electrode Conductor. The grounding electrode conductor(s) in switchboards, panel boards, cutout boxes, transfer switches, and other enclosures, shall be identified according to Section 250-119.

Substantiation:

The grounding electrode conductor is not currently required to be identified, unless it is also used for bonding. It is a common, minimum practice to identify this conductor, to reduce the possibility that it may be mistaken for a current carrying conductor. Many installers identify this conductor to facilitate verification of a proper installation. Because, it is a common practice to identify this conductor, but not a requirement, some installers are not identifying it, and the distinct possibility exists that it may be confused with a current carrying conductor and an improper connection could result in serious damage or injury to persons.

Panel Meeting Action: Reject

Panel Statement:

250.119 addresses equipment grounding conductors, not grounding electrode conductors. Any identification requirements should be included in 250.64.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-19 Log #2199 NEC-P06 **Final Action: Reject**
(310-12)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
310.12 Conductor Identification.
(A) ~~Grounded~~ Earth Conductors. Insulated or covered ~~grounded~~ earth conductors shall be identified in accordance with 200.6.
(B) Equipment Grounding Conductors. Equipment grounding conductors shall be in accordance with 250.119.
(C) Ungrounded Conductors. Conductors that are intended for use as ungrounded conductors, whether used as a single conductor or in multiconductor cables, shall be finished to be clearly distinguishable from ~~grounded~~ earth and grounding conductors. Distinguishing markings shall not conflict in any manner with the surface markings required by 310.11(B)(1).
Exception: Conductor identification shall be permitted in accordance with 200.7.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-5.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-20 Log #2791 NEC-P06 **Final Action: Accept in Principle**
(310-12(C))

TCC Action:

The Technical Correlating Committee directs that this Proposal be referred to Code-Making Panel 2 for information.

Submitter: Michael I. Callanan, NJATC / Rep. IBEW

Recommendation:

Revise text as follows:
(C) Ungrounded Conductors. Conductors that are intended for use as ungrounded conductors, whether used as a single conductor or in multiconductor cables, shall be finished to be clearly distinguishable from grounded and grounding conductors. Distinguishing markings shall not conflict in any manner with the surface markings required by 310.11(B)(1). Branch-circuit ungrounded conductors shall be in accordance with 210.5(C). Feeders shall be in accordance with 215.12.
Exception: Conductor identification shall be permitted in accordance with 200.7.

Substantiation:

This proposal is a companion proposal to (2) proposals to Code-Making Panel 2 that will establish means of identification requirements for ungrounded branch circuit and feeder conductors. If Code-Making Panel 2 accepts these proposals this revision to 310.12(C) will be necessary to correlate with the new requirements.

Panel Meeting Action: Accept in Principle

Revise the recommended text to read as follows:
(C) Ungrounded Conductors. Conductors that are intended for use as ungrounded conductors, whether used as a single conductor or in multiconductor cables, shall be finished to be clearly distinguishable from grounded and grounding conductors. Distinguishing markings shall not conflict in any manner with the surface markings required by 310.11(B)(1). Branch-circuit ungrounded conductors shall be identified in accordance with 210.5(C). Feeders shall be identified in accordance with 215.12.

Panel Statement:

The revised wording meets the intent of the submitter and provides further clarity.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-23 Log #100 NEC-P06 **Final Action: Accept**
(Table 310-13)

Submitter: James M. Daly, General Cable

Recommendation:

In the Application Provisions column for TFE, revise to read:
"...or as exposed ~~open~~ wiring (nickel...".

Substantiation:

This is one of a series of proposals to provide consistency throughout the code in the use of the terms "exposed", "open wiring", and "open runs" as applied to wiring methods.

"Exposed" is used 306 times throughout the code, "open runs" is used 7 times, and "open wiring" is used 29 times but only 10 of those instances do not refer to "open wiring on insulators".

Exposed is defined in Article 100 as shown below.

"Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated or insulated."

"Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access."

Open wiring on insulators is defined in 398.2 as "An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings."

"Open runs" is not defined in the code.

This series of proposals will limit the term "open wiring" to open wiring on insulators (Article 398) and have the term "exposed" apply to "open runs" and open wiring not on insulators.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-24 Log #144 NEC-P06 **Final Action: Reject**
(Table 310-13)

Submitter: Joseph A. Tedesco Boston, MA

Recommendation:

Add information in "Table 310.13 Conductor Application and Insulations" for NM-B, NMC-B, and NMS-B covered by Article 334, and Change UF to UF-B.

Substantiation:

See 800.51 (I) Hybrid Power and Communications Cable. Listed hybrid power and communications cable shall be permitted where the power cable is a listed "Type NM or NM-B" conforming to the provisions of Article 334, and the communications cable is a listed Type CM, the jackets on the listed "NM or NM-B" and listed CM cables are rated for 600 volts minimum, and the hybrid cable is listed as being resistant to the spread of fire.

Panel Meeting Action: Reject

Panel Statement:

Table 310.13 is not applicable to multiconductor cables, only to single conductors and the conductors used in multiconductor cables. Single conductor UF-B cable does not exist.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-25 Log #153 NEC-P06 **Final Action: Reject**
(Table 310-13)

Submitter: Joseph A. Tedesco Boston, MA

Recommendation:

Change "UF" to "UF-B".

Substantiation:

This includes the marking found on this product and should be properly identified in the table.

Panel Meeting Action: Reject

Panel Statement:

UF-B only applies to multiconductor cables. 340.112 does not require 90C conductors and UF-B is accepted in the industry to imply 90C conductors; see 334.112 FPN for NM cable. Table 310.13 applies to single conductors only. Other Articles in Chapter 3 apply to multiconductor cables.

For example, Article 334 addresses the NM constructions. The UF shown in Table 310.13 is for a single conductor whereas Article 340 addresses both single and multiconductor UF cables.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-21 Log #682 NEC-P06 (310-13) **Final Action: Reject**

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise second sentence:
These conductors shall be permitted for use in any of the wiring methods recognized in ~~Chapter 3~~ this Code and specified in their respective tables.

Substantiation:

Chapter 3 wiring methods do not appear to cover overhead aerial spans or open conductors inferred as permitted wiring methods in 225.4, 225.6, 300.37, and 527.4(C), exception.

Panel Meeting Action: Reject

Panel Statement:

This revision would introduce conflicts within the Code since not all wiring methods in Chapter 3 are permitted in Chapters 4 through 7. Overhead aerial spans are covered in Article 396, Messenger Supported Wiring.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-26 Log #1367 NEC-P06 (Table 310-13) **Final Action: Reject**

Submitter: David Sroka Turner Falls, MA

Recommendation:

Add to Table 310.13:
"Two-Hour, Fire Rated Cable RHH...".

Substantiation:

Currently missing from the table.

Panel Meeting Action: Reject

Panel Statement:

A requirement for a two-hour, fire rated cable RHH is not required for general wiring methods. It should be addressed as required in Chapters 5 through 7, since it would be a requirement in addition to the basic RHH in Table 310.13.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-27 Log #1384 NEC-P06 (Table 310-13) **Final Action: Accept in Principle**

Submitter: Richard Fransen, Daiken America, Inc.

Recommendation:

Delete "as permitted in NFPA 79".

Substantiation:

Paragraph 4.2 of the 2001 NEC Style Manual prohibits direct reference to another NFPA standard in mandatory code language.
"4.2 References to Other Standards. References to other standards shall not be in mandatory Code text. References to product standards shall be in an informative annex. References to other Standards shall be in the Fine Print Notes."

Panel Meeting Action: Accept in Principle

Make the following changes in current Table 310-13 in the "Application Provisions" column for "Type MTW".
Delete "as permitted in NFPA 79 (See Article 670.)" in two places.
Add a Fine Print Note to read as follows:
"FPN: See NFPA 79."
In the "Maximum Operating Temperature" column for Type MTW the 60°C should be aligned with "Machine tool wiring in wet locations" and 90°C should be aligned with "Machine tool wiring in dry locations".

Panel Statement:

Article 670 does not mention MTW and MTW is acceptable since Article 670 does not prohibit its use.
The Fine Print Note is added in accordance with 4.2 of the NEC Style Manual.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-22 Log #2497 NEC-P06 **Final Action: Reject**
(310-13)

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 15 for information relative to Proposal 15-72.

Submitter: Kevin C. Shultz, P.E., Walt Disney World Co.

Recommendation:

Revise text to read as follows:
Machine Tool wiring in wet locations as permitted in NFPA 79 (See Article 670.) Machine Tool wiring in dry locations as permitted in NFPA 79 (See Article 670.) Control Circuit wiring for Permanent Amusement Attractions (See Article 519).

Substantiation:

This proposal seeks to allow the use of MTW type wire in the control circuits of Permanent Amusement Attractions, where environmental considerations may include the presence of moisture, heat or oil.
In a separate application, a new article (Article 519 Control Circuits for Permanent Amusement Attractions) is being proposed which describes the applicable materials and methods of wiring control circuits of a permanent amusement attraction where the conditions of maintenance and supervision ensure that qualified persons service the systems. The proposed article is a subset of, and is substantially based on the control circuit wiring methods of NFPA 79 and UL508A which reference and supports the use of MTW type wire. These methods and standards that have been used by the Amusement Attraction Industry. MTW type wire is an appropriate material for integrated control systems in an permanent amusement attraction where the environmental considerations may include the presence of moisture, heat or oil.

Panel Meeting Action: Reject

Panel Statement:

Permission to use MTW should be addressed in the proposed new Article 519; Chapter 3 is for general wiring methods.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-28 Log #3252 NEC-P06 **Final Action: Reject**
(Table 310-13)

Submitter: Steve Reinhart, Reinhart Electric

Recommendation:

Add a column for lowest operating temperature.

Substantiation:

When wiring a freezer unit, the code is not clear as to which conductor covering will work. The manufacturers are not all clear as to how low their covering will go.
I believe a standard needs to be set.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not complied with the requirements of 4-3.3(c) of the NFPA Regulations Governing Committee Projects that proposals must provide the specific "wording to be added, revised (and how revised), or deleted."

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-29 Log #2656 NEC-P06 **Final Action: Accept**
(310-15(A)(1))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Revise existing Section 310.15(A)(1) as follows:
(1) Tables or Engineering Supervision. Ampacities for conductors shall be permitted to be determined by tables as provided in (B) or under engineering supervision, as provided in ~~310.15 (B) and~~ (C)**.**

Substantiation:

Designers, installers and inspectors commonly use the provisions in Section 310.15(B). It should not be necessary to employ the services of an electrical engineer to use these adjustments to conductor allowable ampacity.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-30 Log #3350 NEC-P06 **Final Action: Accept**
(310-15(B)(2), FPN 2 (New))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Insert a new FPN following the present FPN as follows:
FPN No. 2: See 366.7(A) for correction factors for conductors in sheet metal auxiliary gutters and 376.22 for correction factors for conductors in metal wireways.
Change the existing FPN to FPN No. 1.

Substantiation:

This new Fine Print Note will improve the user friendliness of the NEC by pointing out what amounts to exceptions on derating to the general rule in 310.15(B)(2)(a) for conductors installed in sheet metal auxiliary gutters or in metal wireways.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-31 Log #2722 NEC-P06 **Final Action: Reject**
(310-15(B)(2)(a))

TCC Action:

The Technical Correlating Committee directs that this Proposal be referred to Code-Making Panel 7 for information regarding Proposal 7-150a.
The Technical Correlating Committee understands that the action on proposal 7-150a addresses the submitter's Recommendation.

Submitter: Travis Lindsey, Travis Lindsey Consulting Services

Recommendation:

Add a new second paragraph to 310.15(B)(2)(a) as follows:
(a) More Than Three Current-Carrying Conductors in a Raceway or Cable. Where the number of current-carrying conductors in a raceway or cable exceeds three, or where single conductors or multiconductor cables are stacked or bundled longer than 600 mm (24 in.) without maintaining spacing and are not installed in raceways, the allowable ampacity of each conductor shall be reduced as shown in Table 310.15(B)(2)(a).
Where more than two NM cables containing two or more current-carrying conductors each are bundled together and pass through wood framing which is to be fire- or draft-stopped using thermal insulation or sealing foam, the allowable ampacity of each conductor shall be adjusted as shown in Table 310.15(B)(2)(a).

Substantiation:

Recent experimentation shows the possibility of dangerous conditions when loaded circuits are brought into close proximity to each other inside a fire- or draft-stop, where the ability to dissipate heat is extremely limited. Cable temperatures well in excess of their 90 C ratings were encountered, with no overcurrent protection present for these conditions. Results indicate that immediate adjustments should be made to the NEC to apply at least to the specific case represented by the experiment. Such a proposal is being made, with a supplemental report offered as technical support.

Panel Meeting Action: Reject

Panel Statement:

The panel agrees with the intent of this proposal; however, this material is more appropriately addressed in 334.80, since the proposal only applies to one type of cable and Code-Making Panel 6 covers all wiring methods. Therefore, Code-Making Panel 6 has forwarded this proposal to Code-Making Panel 7 for action.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

LAIDLER: This proposal, along with the supporting reports, demonstrates that when type NM-B cable is surrounded by fire- or draft-stop material, such as thermal insulation or sealing foam, the ability of the conductors within the cable to dissipate heat is extremely limited. This is obviously a safety concern that needs to be reviewed. The reason for my rejection of the proposal is that I believe derating the cable may not solve the problem. In my opinion, the safety concern would be better addressed in 334.80 ampacity of NM-B by restricting the ampacity rating of the conductors of NM-B cable to that of 60°C (140°F) conductors whenever it is surrounded or imbedded in thermal insulation.

6-32 Log #2865 NEC-P06 **Final Action: Accept in Part**
(310-15(B)(2)(a))

Submitter: Wayne A. Lilly Bridgewater, VA

Recommendation:

Add a new last sentence to Section 310.15(B)(2)(a) so the section will read as follows:
(a) More than Three Current-Carrying Conductors in a Raceway or Cable. Where the number of current-carrying conductors in a raceway or cable exceeds three, or where single conductors or multiconductor cables are stacked or bundled longer than 600 mm (24 in.) without maintaining spacing and are not installed in raceways, the allowable ampacity of each conductor shall be reduced as shown in Table 310.15(B)(2)(a). When applying the provisions of this section each current-carrying conductor of a paralleled set of conductors shall be counted as a current-carrying conductor.

Substantiation:

Section 310.4 states, in part, "shall be permitted to be connected in parallel (electrically joined at both ends to form a single conductor)." Section 310.15(B)(2)(a) details the ampacity adjustment requirements for installations where "More than Three Current-Carrying Conductors in a Raceway or Cable" are installed.
In applying these provisions, each current-carrying conductor of a parallel set of current-carrying conductors is counted when determining the total number of current-carrying conductors. For example, if two current-carrying conductors are paralleled together for each phase of a three-phase circuit, the total number of current carrying conductors is six. However, the language in 310.4 infers that paralleled conductors, "(electrically joined at both ends to form a single conductor)", are counted as a single conductor as the language uses the word "single". This would result in three (3) current-carrying conductors when applying the example mentioned above. Several contractors have expressed the opinion that paralleled conductors are counted as one conductor when I have turned down the installation.
This proposal is intended to resolve the misconception, presented by the language in 310.4, that paralleled conductors are counted as a single conductor when applying the provisions in 310.15(B)(2)(a).

Panel Meeting Action: Accept in Part

In the wording of the recommendation, the panel does not accept the wording "When applying the provisions of this section".

Panel Statement:

See panel action on Proposal 6-33.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-33 Log #3097 NEC-P06 **Final Action: Accept**
(310-15(B)(2)(a))

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation:

Add a new last sentence to Section 310.15(B)(2)(a) so the section will read as follows:
(a) More than Three Current-Carrying Conductors in a Raceway or Cable. Where the number of current-carrying conductors in a raceway or cable exceeds three, or where single conductors or multiconductor cables are stacked or bundled longer than 600 mm (24 in.) without maintaining spacing and are not installed in raceways, the allowable ampacity of each conductor shall be reduced as shown in Table 310.15(B)(2)(a). Each current-carrying conductor of a paralleled set of conductors shall be counted as a current-carrying conductor.

Substantiation:

Section 310.4 states, in part, "shall be permitted to be connected in parallel (electrically joined at both ends to form a single conductor)." Section 310.15(B)(2)(a) details the ampacity adjustment requirements for installations where "More than Three Current-Carrying Conductors in a Raceway or Cable" are installed.
In applying these provisions, each current-carrying conductor of a parallel set of current-carrying conductors is counted when determining the total number of current-carrying conductors. For example, if two current-carrying conductors are paralleled together for each phase of a three-phase circuit, the total number of current carrying conductors is six. However, the language in 310.4 infers that paralleled conductors, "(electrically joined at both ends to form a single conductor)", are counted as a single conductor as the language uses the word "single". This would result in three (3) current-carrying conductors when applying the example mentioned above. Several contractors have expressed this opinion when I have turned down the installation.
This proposal is intended to resolve the misconception, presented by the language in 310.4, that paralleled conductors are counted as a single conductor when applying the provisions in 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-34 Log #1772 NEC-P06 **Final Action: Reject**
(310-15(B)(2)a Exception No. 6 (New))

Submitter: Robert Sogla, Mayer Electric, Local 292 JATC / Rep. Local 292 JATC, Mayer Electric

Recommendation:

Add text to read as follows:
"Exception No. 6: When no multiwire circuits are used to reduce or eliminate harmonic currents, the adjustments factors shall be as follows:"
Please adjust table as you deem necessary.

Substantiation:

It is common practice to pull 2-4 wire multiwire circuits in a raceway. This leads to 8 wires and derating at 70 percent. If one was to pull an individual grounded conductor with each hot conductor the total load per raceway would be reduced. However, now our derating would be at 50 percent due to the number of conductors.
It is my hope that this will be acknowledged not only for new installations, but make it possible to use existing installations to feed the same number of circuits (where raceway capacity allows it) with more wires, creating less total load, without being penalized for it.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not complied with the requirements of 4-3.3(c) of the NFPA Regulations Governing Committee Projects that proposals must provide the specific "wording to be added, revised (and how revised), or deleted."
While the submitter has provided the text for a new exception, no text was provided for the table.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-35 Log #680 NEC-P06 **Final Action: Reject**
(310-15(B)(3))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Add text to read as follows:
For the purpose of determining their allowable ampacity, bare or covered conductors contained in a raceway, cable, auxiliary gutter, or cable tray with insulated conductors shall be considered to have a temperature rating equal to the lowest insulation temperature rating of the insulated conductors.

Substantiation:

Present wording limits a bare conductor ampacity where part of an overhead aerial span with insulated conductors, whereas Table 310.23 indicates a higher ampacity for bare or covered conductors than Tables 310.17 and 310.19 for insulated conductors of the same size and material. Present wording does not allow for difference in size or material. For example, a bare 500 kcmil copper neutral service conductor installed with 350 kcmil insulated aluminum conductors, to compensate for harmonic currents is limited to the ampacity of the 350 kcmil conductors.
Code tables do not indicate ampacities of bare or covered conductors where not installed in free air. The word "adjacent" is vague; are single conductors of an overhead aerial span with spacing per 225.14 "adjacent"?

Panel Meeting Action: Reject

Panel Statement:

The existing text is clear; this provision applies to applications other than those included in this proposal.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-36 Log #416 NEC-P06 **Final Action: Reject**
(310-15(B)(6))

Submitter: John Phillips, Montgomery College

Recommendation:

Change title to: 120/240 - volt, 3-wire, single phase dwelling unit services and feeders.

Substantiation:

The NEC defines "dwelling" and "dwelling unit" differently. Text applies to dwelling units, not dwellings. A dwelling may contain a residential garage, for example, which could contain a workshop and not name the same diversity as a dwelling unit. Ambiguity between text in this section and table 310.15(B)(6).

Panel Meeting Action: Reject

Panel Statement:

Based upon the action taken on Proposal 6-41, the title is correct.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-42 Log #417 NEC-P06 **Final Action: Reject**
(Table 310-15(B)(6))

Submitter: John Phillips, Montgomery College

Recommendation:

Change title to: Conductor types and sizes for 120/240-volt, 3 wire, single-phase dwelling unit services and feeders.

Substantiation:

Table is titled "dwelling", and accompanying text only refers to "dwelling units". The NEC defines "dwelling" and "dwelling unit" differently. So a detached garage, barn, etc. could be included in a dwelling, but not in a dwelling unit. The committee has already recognized that a residential garage, potentially, does not have the same diversity as a dwelling unit, given that the garage could contain a workshop.

Panel Meeting Action: Reject

Panel Statement:

Based upon the action taken on Proposal 6-41, the title is correct.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-37 Log #681 NEC-P06 **Final Action: Accept in Principle**
(310-15(B)(6))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text to read as follows:
The feeder conductors to a dwelling unit shall not be required to ~~be larger~~ have an allowable ampacity rating higher than their service-entrance conductors.

Substantiation:

The term "larger" usually relates to size; size does not always relate to ampacity. A 6 AWG aluminum conductor does not have the same ampacity as a 6 AWG copper conductor with the same insulation rating. Other disparities in ampacity between service-entrance and feeder conductors with the same size, material, and temperature rating may occur because of derating factors. Table 310.15(B)(6) indicates sizes which can be interpreted that feeder conductors never have to be larger than service-entrance conductors regardless of material, temperature rating, or derating factors. Various sections such as 430.28(3) use the word "ampacity" for conductor comparison.

Panel Meeting Action: Accept in Principle

In the wording of the recommendation, change the word "higher" to the word "greater".

Panel Statement:

The revised wording provides greater clarity. The panel understands that the action on this proposal further modifies the action taken on Proposal 6-41.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-38 Log #1822 NEC-P06 **Final Action: Reject**
(310-15(B)(6))

Submitter: James W. Hines Granite Bay, CA

Recommendation:

Revise as follows:
(6) 120/240-Volt and 120/208-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. For dwelling units, conductors as listed in Table 310.15(B)(6), shall be permitted as 120/240-volt or 120/208-volt, 3-wire, single-phase service-entrance conductors...
FPN: For multifamily dwelling units served by 120/208-volt utility services, verify that motors and air conditioning units are rated for 200-volt or 208-volt rather than 240-volt.

Substantiation:

Multifamily dwelling units are generally served by 120/208 volt, 3 phase, 4-wire utility services and multi-meter boards. These are usually apartments and should draw less amps than single family residences as they have common pools, spas, and exercise rooms. Many have common laundry facilities. The code needs to be updated for this common construction. With 120/208-volt services, a footnote reminder may also be advised.

Panel Meeting Action: Reject

Panel Statement:

No substantiation was provided to justify applying the table to 120/208 volt service entrance conductors.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-39 Log #1883 NEC-P06 (310-15(B)(6)) **Final Action: Reject**

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:

(6) 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. For dwelling units, conductors, as listed in Table 310.15(B)(6), shall be permitted as 120/240-volt, 3-wire, single-phase service-entrance conductors, service lateral conductors, and feeder conductors that serve as the main power feeder to a dwelling unit and are installed in raceway or cable with or without an equipment ~~grounding~~ bonding conductor. For application of this section, the main power feeder shall be the feeder(s) between the main disconnect and the lighting and appliance branch-circuit panelboard(s). The feeder conductors to a dwelling unit shall not be required to be larger than their service-entrance conductors. The grounded conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of 215.2, 220.22, and 230.42 are met.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

See panel statement on Proposal 6-1.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Explanation of Negative:

Comment on Affirmative:

FRIEDMAN: NEMA supports the panel action to reject. The proposal fostered significant debate during the code process. After considering all of the debate, it is clear that the issue is one of education and not terminology. Changing the term from "equipment grounding conductor" to "equipment bonding conductor" in no way changes the need for qualified persons and continuing education. The present terminology is well understood by those who understand the purposes of grounding and bonding. The panel members and the public need to consider the magnitude of this change compared to the benefits. The change will create a nightmare of revisions and changes in terminology across the entire electrical system. The benefit is practically nonexistent.

MCCLUNG: See my affirmative comment on Proposal 6-1.

6-40 Log #2200 NEC-P06 (310-15(B)(6)) **Final Action: Reject**

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:

6) 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. For dwelling units, conductors, as listed in Table 310.15(B)(6), shall be permitted as 120/240-volt, 3-wire, single-phase service-entrance conductors, service lateral conductors, and feeder conductors that serve as the main power feeder to a dwelling unit and are installed in raceway or cable with or without an equipment grounding conductor. For application of this section, the main power feeder shall be the feeder(s) between the main disconnect and the lighting and appliance branch-circuit panelboard(s). The feeder conductors to a dwelling unit shall not be required to be larger than their service-entrance conductors. The ~~grounded~~ earth conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of 215.2, 220.22, and 230.42 are met.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.

I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.

The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.

I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-5.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-41 Log #2491 NEC-P06 **Final Action: Accept in Principle in Part**
(310-15(B)(6))

Submitter: Paul Dobrowsky Holley, NY

Recommendation:

Revise as follows:
(6) 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. For individual units of one family, two-family and Multifamily dwelling units, conductors, as listed in Table 310.15(B)(6), shall be permitted as 120/240-volt, 3-wire, single-phase service-entrance conductors, service lateral conductors, and feeder conductors that serve as the main power feeder to ~~a~~ each ~~dwelling~~ unit and are installed in raceway or cable with or without an equipment grounding conductor. For application of this section, the main power feeder shall be the feeder(s) between the main disconnect and the lighting and appliance branch-circuit panelboards(s). The feeder conductor to ~~a dwelling~~ each unit shall not be required to be larger than their service-entrance conductors. The grounded conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of 215.2, 220.22, and 230.42 are met.

Substantiation:

The present definitions in Article 100 for One, Two, and Multifamily dwelling units, literally limit this application to a One Family Dwelling in a separate building.

Panel Meeting Action: Accept in Principle in Part

Revise the recommended text to read as follows:
(6) 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. For individual dwelling units of one family, two-family and multifamily dwellings, conductors, as listed in Table 310.15(B)(6), shall be permitted as 120/240-volt, 3-wire, single-phase service-entrance conductors, service lateral conductors, and feeder conductors that serve as the main power feeder to each dwelling unit and are installed in raceway or cable with or without an equipment grounding conductor. For application of this section, the main power feeder shall be the feeder(s) between the main disconnect and the lighting and appliance branch-circuit panelboards(s). The feeder conductors to a dwelling unit shall not be required to be larger than their service-entrance conductors. The grounded conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of 215.2, 220.22, and 230.42 are met.

Panel Statement:

The panel does not agree with changing "a dwelling" to "each" since a dwelling unit is defined in Article 100.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-43 Log #222 NEC-P06 **Final Action: Reject**
(Table 310-16)

Submitter: Stephen John Chernetski, Raasch Associates, Inc.

Recommendation:

Add a Fine Print Note that states: "See Annex B for applications with more than one underground conduit in close proximity (within 5 ft center-to-center) to another".

Substantiation:

The 1987 NEC included Table 310-27 for applications using underground conduits. This included reduced ampacities when 3 or 6 conduits were in close proximity to one another. In 1990, Table 310-27 was modified and moved to Appendix B (Table B-310-7). How to account for adjacent conduits is explained in Annex B.

Panel Meeting Action: Reject

Panel Statement:

The Fine Print Note already contained in 310-15(C) meets the Submitter's intent.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-44 Log #1132 NEC-P06 **Final Action: Reject**
(Table 310-16)

Submitter: Ray C. Mullin, Ray C. Mullin / Rep. Ray C. Mullin Books

Recommendation:

Revise the allowable ampacity for 500 kcmil copper conductors in the 75 degree column from 380 amperes to 400 amperes.

Substantiation:

The majority of electrical inspectors accept 500 kcmil copper 75°C conductors as having an ampacity of 400 amperes. There have been no recorded problems. Most load calculations have the 125 percent built-in safety factor.

The ratio and proportion of circular mil areas and present allowable ampacity values results in higher costs for the conductors and the higher costs (labor and material) for the required raceway sizing.

A precedent is already in place in 310.15(B)(6) for single-phase dwelling services.

Let's look at the rationale of this proposal. Comparing the circular mil area and allowable ampacity (75°C) of some sizes of copper conductors:

INSERT TABLE (CIRCULAR MILS) HERE

(Table shown on page 2728)

Panel Meeting Action: Reject

Panel Statement:

Changing the ampacity of an insulated conductor requires technical substantiation.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-45 Log #2721 NEC-P06 **Final Action: Accept in Principle in Part**
(Table 310-16, Table 310.17, Table 310.18, Table 310.19)

Submitter: Travis Lindsey, Travis Lindsey Consulting Services

Recommendation:

Add footnote to bottom of all tables cited, as follows:

Where conductors are installed within conduits and exposed outdoors to direct sunlight, add 30 F (17 C) to the expected maximum outdoor temperature to determine the ambient temperature.

Substantiation:

Recent experimentation shows that a significant temperature rise can be expected for any conductor within a conduit installed outdoors in direct sunlight. Data indicates that a rise of 30 F (17 C) can be expected for bright metal conduits in direct sun. Where this temperature rise is disregarded it could lead to overloaded conductors. Currently NEC does not address temperature rise from solar exposure.

Panel Meeting Action: Accept in Principle in Part

Add a new 310.15(B)(2)(c) to read as follows:

"Installations Outdoors in Direct Sunlight. Where feeders or branch-circuits are installed in raceways outdoors on rooftops which are exposed to direct sunlight, the ampacities of Tables 310.16 and 310.18 shall be derated by a factor corresponding to an outdoor ambient temperature, plus 17 degrees C."

Panel Statement:

The panel notes that this information does not apply to Tables 310.17 or 310.19.

The revised wording meets the intent of the submitter, and the new text is more appropriate in a new 310.15(B)(2)(c) rather than in a footnote.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 9 Negative: 2

Explanation of Negative:

KOMASSA: The submitter's substantiation does not adequately distinguish conduits directly on the roof surface vs supported some distance above the roof. The tests conducted were not thorough in that they were conducted in Las Vegas but not also in a northern climate. Test data shows a 30°F temperature differential during 3-4 afternoon hours but does not present evidence of degradation of conductor insulation. The submitter has supplied a detailed technical report, however, the test method is not an approved ANSI or NEMA test procedure for determining conductor derating due to direct sunlight on the raceway.

LIGGETT: This proposal should have been rejected. The testing was not conducted on all conduit installation methods on rooftops. Not all conduits are installed within 1/2 in. of the rooftop. Conduits installed a distance greater than 1/2 in. may not be impacted as the ones tested. Sufficient testing has not been performed and test data has not been provided to require the change for all conduits on rooftops where exposed to direct sunlight. The wording proposed by the panel would require derating where it is unnecessary.

6-46 Log #3122 NEC-P06 **Final Action: Accept**
(Table 310-18 and 310.19)

Submitter: Austin D. Wetherell, Underwriters Laboratories, Inc.

Recommendation:

Add "SA" to the types at the top of the 200°C column in both tables.

Substantiation:

When SA was changed to 200°C in the 1996 NEC, it was not added to the ampacity tables.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-47 Log #2010 NEC-P06 **Final Action: Accept**
(Figure 310-60)

Submitter: Neil F. LaBrake, Jr., Niagara Mohawk, a National Grid Company / Rep. Edison Electric Institute - Electric Light & Power Group

Recommendation:

Delete Detail 4 from Figure 310.60.

Substantiation:

Detail 4 is a drawing of a three by three duct bank with power cables in all nine ducts. The detail is not used or referenced in any part of the code. (This same figure is appropriately reproduced in Annex B as Figure B.310.2) The ampacity of such a duct bank is complicated to calculate since the cable in the center duct is bounded by the other cables and heat from that cable interacts with the other cables. Hence, heat is restricted from leaving the center cable into the surroundings, and it raises the temperature of the other cables. The ampacity of such a duct bank should be calculated only under engineering supervision as detailed in Annex B and 310.60(D).

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-48 Log #3121 NEC-P06 **Final Action: Accept**
(Table 310-62)

Submitter: Austin D. Wetherell, Underwriters Laboratories, Inc.

Recommendation:

Add an additional line at the bottom:
1001-2000 3.56 140 3.56 140

Substantiation:

The larger sizes are now covered in UL's Standard UL 44 with the specified thickness. These are the same thickness shown in ICEA 5-95-698 as well. Larger sizes are desirable as opposed to using two smaller sizes in parallel.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-49 Log #2121 NEC-P06 **Final Action: Accept**
(Table 310-63)

TCC Action:

It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting. This action will be considered by the panel as a public comment.

Submitter: David Brender, Copper Development Assn. Inc.

Recommendation:

Revise the title of Table 310.63. Revise Table 310.63 to eliminate the 5001-8000 Volt Percent Insulation heading and the columns under there.

Change the title of Table 310.63 as follows:

Table 310.63 Thickness of Insulation and Jacket for Nonshielded Solid Dielectric Insulation ~~Rated 2001 to 8000 Volts~~.

Eliminate the 5001-8000 Volt Percent Insulation heading and the columns there under.

Substantiation:

This proposal is intended to enhance safety. Commercial specifiers have installed 5-kV to 8-kV cable without shielding because such construction is allowed by the NEC. Many cable manufacturers specifically recommend against nonshielded cable above 2-kV, but are hesitant to insist on shielding because of concern of having the customer source another supplier. However, several cable manufacturers have experienced arcing problems in customer installations where the cable conductors are separated outside of the outer sheath. These arcing instances are numerous, and present a possible safety hazard.

Note: See proposal for modifications to Section 310.6 (exception), and documentation submitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 9 Negative: 2

Explanation of Negative:

KOMASSA: See my Explanation of Negative Vote on Proposal 6-12.

LIGGETT: Insufficient substantiation was provided to require this change. Although the change would correct the problems illustrated in the proposal documentation, different work practices in the installation would also fix the problem without limiting a widely used and accepted installation method. This change would create other installation problems in some cases. This proposal should be rejected until further study can be done to understand the implications of this change.

Comment on Affirmative:

MCCLUNG: This proposal for NEC 2005 to eliminate general usage of 5001-8000 volt heading and the columns underneath should be accepted with exceptions as follows;

In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installations; 1) nonshielded cables may be permitted up to 5000 volt to accommodate terminating cable in boxes and enclosures having restricted space that does not allow for stress relief cones; 2) nonshielded cables may be permitted up to 8000 volt for leads from 13800 volt line-to-line transformer neutrals to impedance ground devices. 2) nonshielded cables may be permitted up to 8000 volt for leads from the neutral point on a 13,800 volt (line-to-line) transformer, generator, or zig-zag grounding transformer to an impedance ground device.

ZIMNOCH: The title over columns 2 through 13 in the table should also have been changed from "2001 - 5000 Volts" to "2001-2400 Volts" to correlate with the panel actions on this proposal and Proposal 6-12.

6-50 Log #505 NEC-P06 **Final Action: Accept**
(Table 310-64)

Submitter: James M. Daly, General Cable

Recommendation:

Revise Table 310.64 to include 173 Percent Insulation Levels.
Add an additional column with the heading "173 Percent Insulation Level[3]" after each of the five "133 Percent Insulation Level 2" columns.
The insulation thicknesses to be entered into the new columns is as follows:

***Insert Tables here ***

(Table shown on page 2728)

Add an additional note to the table as follows:
[3] 173 Percent Insulation Level. Cables in this category shall be permitted to be applied under the following conditions.
(1) in industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation
(2) where the fault clearing time requirements of the 133 percent level category cannot be met
(3) where an orderly shutdown is essential to protect equipment and personnel, and
(4) there is adequate assurance that the faulted section will be de-energized in an orderly shutdown
Also, cables with this insulation thickness shall be permitted to be used in 100 or 133 percent insulation level applications where additional insulation strength is desirable.

Substantiation:

In continuous process industries such as petrochemical, pulp and paper, steel, etc., significant damage to equipment and possible injury to workers can be avoided only if an orderly shutdown is employed. Frequently, it is not possible to accomplish an orderly shutdown of a continuous process within the 1-hour time limitations for the 133% insulation level.
The Insulation Cable Engineers Association (ICEA) and the Association of Edison Illuminating Companies (AEIC) recognize the 173 percent insulation levels. The 173 percent insulation levels are also specified in IEEE Standard 1242-1999, *IEEE Guide for Specifying and Selecting Power, Control, and Special-Purpose Cable for petroleum and Chemical Plants.*
Addition of the 173 percent insulation level to the Code will recognize an existing safe practice and yet, with the limitations specified in the note to the table, will limit this fault de-energizing time to very specific applications and not permit widespread use.
The last sentence will make it clear that 173 percent insulation cables can be used instead of 100 or 133 percent insulation cables but the system must still remain a 100 or 133 percent category and faults cleared as required by those two categories.

Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
LAIDLER: The submitter has provided inadequate technical substantiation to warrant this significant revision; merely referencing other technical documents that include the 173 percent ratings is not sufficient basis for adding the provision.
The substantiation states that the 1-hour rating presently permitted when the 133 percent column is utilized is not adequate for many installations that require orderly shutdowns that may exceed the 1 hour time limit. What are some examples of these types of cases? How prevalent are they and does the addition of the 173 percent column open the door for possible misuse of this requirement?
Finally, the substantiation states that this practice is "safe" and already in wide use. It may be in wide use, if so, it is a violation of Table .64. It should not be the purpose of the Code to put into place provisions that are "widely used" just because they are widely used. That is not sufficient technical substantiation.

6-51 Log #506 NEC-P06 **Final Action: Accept in Principle**
(Table 310-64)

Submitter: James M. Daly, General Cable

Recommendation:

In Note 2, revise the last sentence as follows:
"Also, they shall be permitted to be used in 100 percent insulation level applications where additional insulation strength ~~over the 100 percent level category~~ is desirable."

Substantiation:

This revision will make it clear that 133 percent insulation cables can be used instead of 100 percent insulation cables but the system must still remain a 100 percent category and faults cleared within 1 minute.

Panel Meeting Action: Accept in Principle
In the recommended wording, delete the word "strength" after the word "insulation".
Panel Statement:
The deletion of the word "strength" provides clarity and avoids confusion.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-52 Log #507 NEC-P06 **Final Action: Accept**
(Table 310-64)

Submitter: James M. Daly, General Cable

Recommendation:

In the column headings, change "Level 1" to "Level[1]" and "Level 2" to "Level[2]".

Substantiation:

Editorial correction. The numbers should be superscript since they refer to the notes at the bottom of the Table, which are identified by superscript numbers.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-53 Log #2250 NEC-P06 **Final Action: Reject**
(Table 310-64)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise table to read as follows:

Insert table 310.64 NEC/A04/ROP here*

(Table shown on page 2729)

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.

I propose to change the word "grounded" to "earth" throughout the Code book, when the word "grounded" is used in reference to a conductor.

The NFPA has repeatedly stated its desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.

I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-5.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-54 Log #2775 NEC-P06 **Final Action: Accept**
(Table 310-64)

Submitter: C. David Mercier, Southwire Co.

Recommendation:

Please revise as follows:

Change the insulation level thickness from 345 mils (8.76mm) to 320 mils (8.13mm) for conductors rated 15,001 - 25,000 Volts, 133% Insulation Level 2, sizes 1 and 1/0 AWG through 2000 kcmil.

Substantiation:

This change will bring the NEC in line with the requirements of ICEA S-93-639/ NEMA WC74 Table 8-2. This change will also allow UL to change the thickness in UL 1072 to reflect industry standard levels.

Insert Table 8-2 Here

(Table shown on page 2730)

Panel Meeting Action: Accept

Panel Statement:

The panel understands that the "2" after "Insulation Level" in the recommended text will be a superscript "2".

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-55 Log #3125 NEC-P06 **Final Action: Accept**
(Table 310-64)

Submitter: Lowell S. Lisker, American Insulated Wire Corp.

Recommendation:

Revise the 8001 - 15,000 Volts columns for 133 Percent Insulation Level from 5.46 mm/215 mils to 5.59 mm/220 mils.
Revise the 15,001 - 25,000 Volts columns for 133 Percent Insulation Level from 8.76 mm/345 mils to 8.13 mm/320 mils.

Substantiation:

Cable manufacturers must frequently manufacture a cable to meet multiple industry standards such as UL 1072; ICEA S-93-639/NEMA WC 74; and AEIC CS5 and CS6. By revising the wall thicknesses to agree with AEIC CS5 and CS6 Table C-1 and ICEA S-93-639 Table 8-2, all standards can be met.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-56 Log #1154 NEC-P06 **Final Action: Reject**
(Table 310-69 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

The addition of a footnote is unnecessary because the definition of "Ampacity" is sufficiently defined in Article 100.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-57 Log #1155 NEC-P06 **Final Action: Reject**
(Table 310-70 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-58 Log #1156 NEC-P06 **Final Action: Reject**
(Table 310-71 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-59 Log #1157 NEC-P06 **Final Action: Reject**
(Table 310-72 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-60 Log #1158 NEC-P06 **Final Action: Reject**
(Table 310-73 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given n section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-61 Log #1159 NEC-P06 **Final Action: Reject**
(Table 310-74 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-62 Log #1160 NEC-P06 **Final Action: Reject**
(Table 310-75 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-63 Log #1161 NEC-P06 **Final Action: Reject**
(Table 310-76 (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-64 Log #1162 NEC-P06 **Final Action: Reject**
(Table 310-77 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-65 Log #1163 NEC-P06 **Final Action: Reject**
(Table 310-78 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-66 Log #1164 NEC-P06 **Final Action: Reject**
(Table 310-79 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-67 Log #1165 NEC-P06 **Final Action: Reject**
(Table 310-80 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-68 Log #1166 NEC-P06 **Final Action: Reject**
(Table 310-80 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-69 Log #1167 NEC-P06 **Final Action: Reject**
(Table 310-82 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-70 Log #1168 NEC-P06 **Final Action: Reject**
(Table 310-83 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-71 Log #1169 NEC-P06 **Final Action: Reject**
(Table 310-84 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-72 Log #1170 NEC-P06 **Final Action: Reject**
(Table 310-85 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-73 Log #1171 NEC-P06 **Final Action: Reject**
(Table 310-86 Note (New))

Submitter: John E. Conley Stratford, CT

Recommendation:

Add new footnote to table:
Ampacities in this table have been calculated using the formula given in section 310-15(C).

Substantiation:

This is a correlating proposal offered in conjunction with a proposal to revise the ampacity definition in Article 100. See substantiation to that proposal.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on Proposal 6-56.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-5 Log #2534 NEC-P09 **Final Action: Accept in Principle in Part**
(312-2(A))

Submitter: Alan Manche, Schneider Electric/Square D

Recommendation:

Revise NEC 312.2(B) with the additions (underlined) and deletions (strike through) as shown. The entire text of 312.2(B) is shown for clarity, but only those changes shown underlined or strike through are part of this proposal.

312.2 Damp, Wet, or Hazardous (Classified) Locations.

(A) Damp and Wet Locations. In damp or wet locations, surface-type enclosures within the scope of this article shall ~~be~~ comply with the following:

1) Be placed or equipped so as to prevent moisture or water from entering and accumulating within the cabinet or cut-out box,

2) Be ~~and mounted~~ so there is at least 6 mm (1/4 in.) airspace between the enclosure and the wall or other supporting surface.

3) Enclosures installed in wet locations shall be weatherproof.

4) Raceways or cables entering an enclosure above live parts in a wet location shall use a connector that is listed as raintight or liquidtight when connected to an enclosure.

Substantiation:

The present material in 312.2 has been revised into a more readable format in accordance with the style manual. Item 4 is new material and has been added to ensure that appropriate connections are made to the enclosure. There is presently no language in the NEC that provides guidance for the appropriate interface between the enclosure and the raceway or cable entering a cabinet in order to maintain the appropriate environmental rating for the enclosure.

Panel Meeting Action: Accept in Principle in Part

Add the following sentence to the end of 312.2(A):

For enclosures in wet locations, raceways or cables entering above live parts shall use fittings listed for wet locations.

The Exception and FPN to remain.

Panel Statement:

CMP 9 recognizes the intent of the submitter to address Section 312.2(A). The panel rejects the list format because it violates 3.3.5 of the NEC Style Manual. The submitter addresses the practical matter of securing wiring methods that enter an enclosure in a wet location above live parts.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: This is a useful proposal that makes an appropriate distinction between the need for weatherproof enclosures in wet locations (already in the Code), and the need for absolute watertight connections in areas where the wiring would lead water directly into live parts. The panel properly substituted "fittings" for "connector" to include such items as sealing locknuts for this purpose. The list format in the proposal is not appropriate, however, because it would lead to confusion between requirements for both wet and damp locations with those for just wet locations.

NEMA companies should be absolutely certain that products are readily available to meet this requirement, or propose a delayed effective date. For example, for a very long time UL never stood behind the watertight integrity of gland-type SE cable connectors (for the good reason that they weren't), and to address this there are millions of installations with duct seal applied in the field above meter sockets. Although this has started to change, if a comprehensive listing requirement is not practical, then the following version could be used: "Wiring methods entering enclosures in wet locations above live parts shall be connected in a weatherproof manner." The panel version is better, but only if the industry will not be left with an impractical rule that will affect almost every overhead service change.

9-6 Log #1037 NEC-P09 **Final Action: Reject**
(312-5)

Submitter: Glenn W. Zieseniss Crown Point, IN

Recommendation:

Add ( ) around the "s" of the word "Conductors" in the first word of the text so as to read:
Conductor(s) entering enclosures within...".

Substantiation:

The word conductors indicatesthat there must be more than one conductor so as to require to be secured to the enclosure. The text of 312.5(B) indicates any wiring entering the enclosure is required to be "firmly secured to the enclosure." This change would indicate that any conductor(s), one or more, is required to be secured to the enclosure. Grounding Electrode Conductor(s) (GEC) are usually single conductor and should be required to be secured to the enclosure so that any stress placed on the GEC on the exterior of the enclosure will not be transmitted to the termination of the conductor inside the enclosure. Example, a lug secured to the enclosure in a horizontal position with the conductor vertically down through an open hole could easily be loosened if stress is placed on the unsecured conductor where it enters the enclosure.

Panel Meeting Action: Reject

Panel Statement:

Section 250.64(B) adequately addresses the submitter's concerns about the securing of the grounding electrode conductor.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: The word "conductors" is inclusive and can be applied to single or multiple conductors. I think this section applies to both instances, including grounding electrode conductors. However, I agree with the panel that the proposal should be rejected, and that grounding electrode conductors do not require additional attachments. A steel edge will not abrade a copper (or aluminum) conductor as usually arranged, and such openings have been a standard feature of numerous enclosure brands for years. 312.5(A) precludes the use of a conventional knockout for this purpose without a suitable connector that will close up the opening; 312.5(B) does not apply, and 312.5(C) only applies to cables. No problem.

9-7 Log #3446 NEC-P09 **Final Action: Reject**
(312-5)

Submitter: Joseph Watson, Watson Electrical & Mechanical Corp.

Recommendation:

Exception: delete surface mounted.

Substantiation:

It is easy to add conduits (circuits) to surface mounted panels/cabinets. It can be very difficult to add circuits to flush mounted panels/cabinets. If the panel is flush mounted and the wall is an outside wall, or near an outside wall, holes cannot be drilled in the top of the wall, wires cannot be fished to the panel, therefore the finished wall must be unnecessarily removed and refinished (at additional unnecessary cost) just to add one circuit. And again later to add another circuit each time a new circuit is needed.

Panel Meeting Action: Reject

Panel Statement:

Permission for use with other than surface mounted enclosures will confuse the issue of penetrating a structural ceiling. Most flush mounted applications would involve penetration of building structural members if the exception were to be utilized.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: In thirty plus years of installation experience I have never, when responsible for such design decisions, stranded a flush panel without a raceway leading to a box at an accessible location. The NEC already allows this, and it would accomplish the submitter's objectives. The proposal apparently addresses 312.5(C) Exception, which trades off a less-than-perfect cable attachment scheme to obtain an obvious improvement in workmanship. This trade-off does not apply to flush installations. ROP users may want to review Proposal 9-66a in the 1996 cycle and related comments.

9-8 Log #325 NEC-P09 **Final Action: Reject**
(312-5(A))

Submitter: Alan H. Nadon, City of Elkhart, IN

Recommendation:

Revise text to read as follows:
312.5(A) Openings to be Closed. Openings for breakers, or through which conductors enter shall be adequately closed.

Substantiation:

The change of Section 110.12 that specified only openings for cables and raceways had to be closed, did not address the fact that unused breaker spaces also need to be closed.

Panel Meeting Action: Reject

Panel Statement:

This proposal addresses the incorrect section. Section 408.18 would correctly identify the section to identify openings in a dead front panelboard. See the panel action and statement on Proposal 9-119 (Log #323).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-9 Log #101 NEC-P09 **Final Action: Accept**
(312-5(B))

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
"... are installed with open wiring on insulators or concealed knob-and-tube...".

Substantiation:

This is one of a series of proposals to provide consistency throughout the code in the use of the terms "exposed", "open wiring", and "open runs" as applied to wiring methods.
"Exposed" is used 306 times throughout the code, "open runs" is used 7 times, and "open wiring" is used 29 times but only 10 of those instances do not refer to "open wiring on insulators".
Exposed is defined in Article 100 as shown below.
"Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated or insulated."
"Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access."
Open wiring on insulators is defined in 398.2 as "An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings."
"Open runs" is not defined in the code.
This series of proposals will limit the term "open wiring" to open wiring on insulators (Article 398) and have the term "exposed" apply to "open runs" and open wiring not on insulators.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-10 Log #2909 NEC-P09 **Final Action: Accept**
(312-5(B))

Submitter: Dorothy Kellogg, American Chemistry Council

Recommendation:

Add the term "messenger supported wiring' and the words "on insulators" as shown:
(B) Metal Cabinets, Cutout Boxes, and Meter Socket Enclosures. Where metal enclosures within the scope of this article are installed with messenger supported wiring, open wiring on insulators or concealed knob-and-tube wiring, conductors shall enter through insulating bushings or, in dry locations.

Substantiation:

The phrase "Open Wiring" appears more than 30 times in the current 2002 NEC, but it exists in two distinct formats: a) as the defined "open wiring on insulators" by article 398.2, or b) simply as the undefined term "open wiring". With the defined term, open wiring makes reasonable sense. However when used as the undefined term "open wiring', especially when used to describe a cable that is required to have mechanical integrity and protection takes on an entirely different meaning. Clearly such as installation is not "open". Due to the significant difference in the use of the terms, this and associated other proposals if accepted would replace the undefined use of the term "open wiring" with more appropriate language that addresses the installation in 501.4(B)(1)(5); 505.1 Exception No. 2; 503.3(B); 504.30(A)(1); 505.15(C)(1)(c); 505.16(C)(1) Exception No. 2; 610.12(A); 725.61(D)(4); and 727.4(4)(5)(6) and use the full 398.2 defined term where the text suggest as in 300.16(A); 312.5(B); 314.17(C). Again, individual proposals have been submitted to address each section mentioned. Since the concept of open wiring may also have permitted messenger supported wiring, with this change, this term has been added.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-11 Log #3447 NEC-P09 **Final Action: Reject**
(312-5(C))

Submitter: Joseph Watson, Watson Electrical & Mechanical Corp.

Recommendation:

Revise text to read as follows:
312.5(C) Exception: Cables with entirely nonmetallic sheaths shall be permitted to enter the top or bottom of a surface-mounted enclosure through one or more nonflexible raceways not less than 400 mm (18 in.) or more than 3.0 m (10 ft) in length, provided all the following are met:
(a) Each cable is fastened within 300 mm (12 in.), measured along the sheath, or as close as physically possible to the outer end of the raceway.

Substantiation:

When adding cables to outside surface mounted panels, the cables are piped to a crawl space, an attic, or a joist space that can be fished to the appropriate area. In many of these situations, the cables cannot be secured within the 12 in. presently required (for instance, the attic on a hip roof, a person cannot get to the edge of the attic or when fishing a joist space, the cable cannot be secured within the 12 in.)

Panel Meeting Action: Reject

Panel Statement:

The exception should not be utilized in locations where it is not possible to properly secure the conductors. The dimension in the existing code reflects the distances allowed at typical nonmetallic wiring method terminations. The submitter's substantiation is subjective and does not provide justification to expand the requirement to the bottom of the enclosure.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: Note that the panel statement referring to nonmetallic wiring method terminations is actually a reference to such terminations without clamps in 314.17(C) Exception, and not the normal termination distances in the various cable articles.

9-12 Log #463 NEC-P09 **Final Action: Reject**
(312-5(C) Exception)

Submitter: Jeffrey A. Fecteau, City of Peoria, Arizona

Recommendation:

Revise as follows:
Exception: Cables with entirely nonmetallic sheaths shall be permitted to enter the top, back, or side of a surface mounted enclosure through one or more nonflexible raceways or fittings not ~~less than 450 mm (18 in.)~~ ~~or~~ more than 3.0 m (10 ft) in length, provided all of the following conditions are met:
(a) Each cable is fastened within 300 mm (12 in.) measured along the sheath of the outer end of the raceway.
(b) The raceway or fitting extends into a wall or ceiling space directly above or behind the enclosure and does not penetrate a structural ceiling.
~~(c)~~ A fitting is provided on each end of the raceway to protect the cable(s) from abrasion when a raceway is used ~~and the fittings remain accessible after installation.~~
(d) The raceway or fitting is sealed or plugged at the outer end using approved means so as to prevent access to the enclosure through the raceway.
(e) The cable sheath is continuous through the raceway or fitting and extends into the enclosure beyond the fitting not less than 6 mm (1/4 in.)
(f) The raceway or fitting is fastened at its outer end and at other points in accordance with the applicable article.
(g) Where installed as conduit or tubing, the allowable cable fill does not exceed that permitted for complete conduit or tubing systems by Table 1 of Chapter 9 of this code and all applicable notes thereto.

Substantiation:

This will allow a code compliant installation that has been allowed for an unknown amount of time. This installation is currently a code violation however it would appear that no one in the Phoenix and Tucson Metro areas chooses to enforce. I have provided several E-mail exchanges as well as photos that identify the problem with no one willing to require a code compliant installation. It would appear to be a manufacturing issue also. As you can see from the photos provided, how else would you enter into this all-in-one enclosure?
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

The installation procedure described in the proposal is one that CMP-9 voted to prohibit during the three code making cycles (1993, 96 and 99) when these rules were formulated. Connectors or fittings as presented in the substantiation are not designed for this purpose. A connector, bushing or other fitting without a length of raceway creates the possibility that the enclosure will no longer perform its intended containment function.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-13 Log #1671 NEC-P09 **Final Action: Reject**
(312-5(C)(b))

Submitter: Kim Frase, Frase Electric LLC

Recommendation:

Revise text as follows:
(b) The raceway extends directly above the enclosure and ~~does not~~ if it penetrates a structural ceiling necessary fire stop or drafts stop is installed if applicable to fire rating of building.

Substantiation:

Condition (b) would not allow installation of nipple into a sheet rock or similar ceiling so if electrical room has a sheet rock ceiling, you couldn't use this exception. A neater job is achieved when a nipple is brought through a sheet rock ceiling. Plus it is much easier to fire stop around a few round conduits than several cables.

Panel Meeting Action: Reject

Panel Statement:

The panel calls the submitter's attention to item "c" in the exception, which requires the end of the raceway to be accessible after installation. This correlates with 300.15(F), and is inconsistent with burying the fitting in a joist cavity.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-14 Log #969 NEC-P09 **Final Action: Accept in Principle**
(312-21)

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Renumber so as to create a new Section 312.21 with identical wording to the present Section 314.21, substituting only "cabinet or cutout box" for ~~"box or fitting"~~.

Substantiation:

If 314.21 has a valid safety purpose, it seems that it would apply here as well. See paired proposal to eliminate 314.21 as an alternative to changing this section.

Panel Meeting Action: Accept in Principle

Accept the creation of a new section as described by the submitter. Renumber the new section as 312.4.

Panel Statement:

This action meets the intent of the submitter and renumbers the new section at 312.4 rather than 312.21.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: It may be necessary to add the words "employing a flush-type cover" at the end of the sentence in order to retain functional parity with 314.21. Snap switches, receptacles, etc. are rarely sold with the box; the enclosure is completed in the field using a faceplate. Although that is indeed comparable to a flush panelboard enclosure with the trim perched on the wall surface, such a requirement would be excessive in the case of a panelboard with a surface mounted cover that telescopes over the base. Many surface mounting panels are installed recessed to a greater or lesser degree.

9-15 Log #1402 NEC-P09 **Final Action: Accept in Principle**
(314 Title)

TCC Action:

The Technical Correlating Committee advises that Article Title and Scope are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee "Accepts" the panel action.

Submitter: Ronald E. Maassen, Lemberg Electric Co., Inc. / Rep. NECA

Recommendation:

Modify Article Title to read:
Outlet, Device, Pull and Junction Boxes; Conduit Bodies; Fittings; Handhole Enclosures and Manholes

Substantiation:

To add handhole enclosure to the Article.

Panel Meeting Action: Accept in Principle

Modify the article title to read as follows:
"Outlet, Device, Pull and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures."

Panel Statement:

See panel statement on Proposal 9-16 (Log #1045).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-17 Log #1046 NEC-P09 (314-1) **Final Action: Accept in Principle**

TCC Action:

The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee "Accepts" the Panel action.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

This is a companion Proposal to add new Article 110 Part V, change Article 314 Title, and delete Part IV of Article 314.
Change 314.1 as follows:
"314.1 Scope.
This article covers the installation and use of all boxes and conduit bodies used as outlet, device, junction, or pull boxes, depending on their use, ~~and manholes and other electric enclosures intended for personnel entry~~. Cast, sheet metal, nonmetallic, and other boxes such as FS, FD, and larger boxes are not classified as conduit bodies. This article also includes installation requirements for fittings used to join raceways and to connect raceways and cables to boxes and conduit bodies."

Substantiation:

This is a result of a companion proposal to move Part IV from Article 314 to Article 110, the content of Part IV in Article 314 is more appropriate in Article 110. This proposed change would have the personnel entry, working clearance and safety requirements of electrical manholes and related fire resistivity contained with other relative information in Article 110.
This is an action of the NEC TG on Usability based on NEC May 2001 ROC Comment 1-175 and NEC May 2001 ROP Proposal 9-51. For other related "user-friendly" substantiation, see NEC May 2001 ROC Comments 9-20 and 9-21.

Panel Meeting Action: Accept in Principle

Panel Statement:

See the panel action and statement on Proposal 9-18 (Log #1404).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

HARTWELL: The proposal should be rejected. Refer to my Explanation of Negative on Proposal 9-73.

9-18 Log #1404 NEC-P09 (314-1) **Final Action: Accept in Principle**

TCC Action:

The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee "Accepts" the Panel action.

Submitter: Ronald E. Maassen, Lemberg Electric Co., Inc.

Recommendation:

Add text to read as follows:
This article covers the installation and use of all boxes and conduit bodies used as outlet, device, junction, or pull boxes, depending on their use and handhole enclosures, manholes and other electric enclosures intended for personnel entry. Cast, sheet metal, nonmetallic, and other boxes such as FS, FD, and larger boxes are not classified as conduit bodies. This article also includes installation requirements for fittings used to join raceways and to connect raceways and cables to boxes and conduit bodies.

Substantiation:

To include handhole enclosures in 314.1 Scope.

Panel Meeting Action: Accept in Principle

Edit the first sentence in the submitters recommenndation to read as follows:
This article covers the installation and use of all boxes and conduit bodies used as outlet, device, junction, or pull boxes, depending on their use, and handhole enclosures.

Panel Statement:

This statement is for clarity and includes the recommended action on Proposal 9-16 (Log #1045) and Proposal 9-17 (Log #1046). This proposal is a result of joint task group between CMP-3 and CMP-9 to allow handhole enclosures. The change in punctuation is editorial and meets the intent of the submitter.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-16 Log #1045 NEC-P09 **Final Action: Accept**
(314-1and 314 Part IV)

TCC Action:

The Technical Correlating Committee advises that Article Title and Scope are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee "Accepts" the panel action. It was also the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 1 for information.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

This is a companion Proposal to add new Article 110 Part V, change Section 314.1, and delete Part IV of Article 314.
Change the title of Article 314 as follows: "ARTICLE 314 Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; and Fittings; ~~and Manholes~~".

Substantiation:

This is a result of a companion proposal to move Part IV from Article 314 to Article 110, the content of Part IV in Article 314 is more appropriate in Article 110 as the working clearance and safety requirements of electrical manholes and related fire resistivity will be contained with other relative information in Article 110 by this proposed change.
This is an action of the NEC TG on Usability based on NEC May 2001 ROC Comment 1-175 and NEC May 2001 ROP Proposal 9-51. For other related "user-friendly" substantiation, see NEC May 2001 ROC Comments 9-20 and 9-21.

Panel Meeting Action: Accept

Panel Statement:

CMP-9 accepts the relocation of "manhole" material to CMP-1 Article 110.
Editors note: Action on Proposal 9-15 (Log #1402)would still add "handhole enclosures" to the title of Article 314.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

HARTWELL: The proposal should be rejected. Refer to my Explanation of Negative on Proposal 9-73.

9-19 Log #3152 NEC-P09 **Final Action: Reject**
(314-2–Enclosure (Underground))

TCC Action:

It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 1 for information.

Submitter: Michael W. Smith, Guarantee Electrical Company

Recommendation:

Article 314 - Definition:
Enclosure (Underground) - An inground box or manhole used for splicing and pulling conductor or cables through. This is installed in a readily accessible location with a cover that will prevent personnel from accidentally contacting energized parts and conductors, or to protect the equipment from physical damage.

Substantiation:

UL has come out with a new listing for "Underground Enclosure" for Strongwell. This enclosure has only been tested as a box used for pulling and splicing of conductors and cables outdoors. Thus, the definition of "Enclosure" as it is written in the '02 NEC would mislead people to install electrical equipment and devices in an "Underground Enclosure". Referencing the UL Listing and Strongwell brochure I have provided, I would like to point out that the manufacturer's literature call this an inground splice box, not an enclosure. If UL would change their listing title from Underground Enclosure to "Inground Box" it would solve the problem, but this is not the forum to impose product listing titles. We are just wanting to make it clear to the installer that the products are installed for the uses it is listed for.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

The definition is incorrect and should be covered in Article 100 as a "handhole enclosure". See panel action and statement on Proposal 9-18 (Log #1404) and CMP-1, Proposal 1-109 (Log #2662).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-20 Log #3313 NEC-P09 **Final Action: Reject**
(314-3)

Submitter: Sukanta Sengupta, FMC Corp.

Recommendation:

Revised text:
314.3 Nonmetallic Boxes. Nonmetallic boxes shall be permitted with the following wiring methods.
Nonmetallic raceways
Cabled wiring methods with entirely nonmetallic sheaths.
Metal raceways or metal-armored cables in nonmetallic boxes with internal bonding means between all entries metal raceway or metal-armored cables in listed nonmetallic boxes with integral bonding means and provisions for attaching equipment bonding jumpers between all threaded entries.
Concealed knob-and-tube wiring.
Flexible cords.
Open wiring on insulators.

Substantiation:

Nonmetallic boxes are widely used as integral parts of metal raceways based on 314.3 Exception No. 1 and Exception No. 2. The wiring method is very common and should not be segregated as an exception.

Panel Meeting Action: Reject

Panel Statement:

The practice of mixing metallic and nonmetallic raceways and boxes is one that requires precautions in order to provide a safe installation. The use of exceptions reinforces these precautions. The exceptions address two very different applications, which are not correctly addressed in the Proposal text.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

SENGUPTA: I recommend CMP 9 to consider accepting this proposal in principle.
The wiring practice of metallic raceways and nonmetallic boxes should not be considered as exception as it is not rare in industrial plants. This article deals with "Nonmetallic Boxes" and all wiring methods to these boxes should be considered in the article. Panel statement of CMP 9 recognizes the criticality of safe installation of this wiring practice; and making these exceptions as part of the article will emphasize the safety aspect.
The trend of code making is to incorporate exceptions to articles for simplification of the code; accepting this proposal will follow the trend.

9-21 Log #257 NEC-P09 **Final Action: Accept**
(314-4)

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
All metal boxes shall be grounded ~~in accordance with the provisions of Article 250.~~

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."
90.3 states that Chapters 1, 2, 3, and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-22 Log #2203 NEC-P09 **Final Action: Reject**
(314-4)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
314.4 Metal Boxes. All metal boxes shall be grounded and earthed in accordance with the provisions of Article 250.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.

I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.

The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.

I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

See the panel statement on Proposal 9-1 (Log #2453i).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-23 Log #1405 NEC-P09 **Final Action: Accept in Principle**
(314-15 Exception (New))

TCC Action:

The Technical Correlating Committee directs that the Panel clarify the Panel Action on this Proposal and identify the exact text of the exception. This action will be considered by the Panel as a Public Comment.

Submitter: Ronald E. Maassen, Lemberg Electric Co., Inc.

Recommendation:

Add new Exception to read:
Exception: Approved handhole enclosure provided with conductors, splices, tapes and terminations listed for the environment in which they are installed need not be designed to prevent the entrance or accumulation of moisture.

Substantiation:

Handhole enclosures with conductors, splices, taps and terminations that are approved for the environment need not be in a water type enclosure and will allow the use of bottomless enclosures.

Panel Meeting Action: Accept in Principle

Revise the submitter's recommenation as follows:
Handhole enclosures shall not be required to prevent the entrance or accumulation of moisture.

Panel Statement:

This editorial change meets the intent of the submitter. The requirement for listed conductors, splices, taps and terminations is in Section 300.15.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-24 Log #21 NEC-P09 **Final Action: Reject**
(314-15(A))

NOTE: The following proposal consists of Comment 9-4 on Proposal 9-12 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 9-12 was:
Revise text to read as follows:
(a) Damp or Wet Locations. In damp or wet locations, boxes, conduit bodies, and fittings shall be placed or equipped so as to prevent moisture from entering or accumulating within the box, conduit body, or fitting. Boxes, conduit bodies, and fittings installed in wet locations shall be listed for use in wet locations. Junction Boxes used for direct burial applications shall have an enclosure Type 6P rating.

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Accept in principle, revise Panel Action:
Add after first sentence: A surface mounted box installed outdoors in a location protected from the weather, or in other damp locations and containing a switch(es) or receptacle(s) shall be listed for wet locations.

Substantiation:

This section does not require a box in damp locations to be listed for wet locations, which is reasonable, and the proposal only requires this where the box contains switches or receptacles, in accordance with 380-4 and 410-57(a). The requirements of those sections is justified due to contact by persons. A requirement in this section would provide correlation and be user friendly.

Panel Meeting Action: Reject

Panel Statement:

Articles 404 and 406 cover the requirements for boxes containing switches and receptacles in wet and damp locations.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-25 Log #3105 NEC-P09 **Final Action: Reject**
(Table 314-16(A))

Submitter: Sukanta Sengupta, FMC Corp.

Recommendation:

In Table 314.16(A) ~~Metal~~ Boxes change "device" to "rectangular" in the 4th and 5th sections down.

Substantiation:

1. Table 314.16(A) should cover both metallic and nonmetallic boxes.
2. Editorial revision: "Rectangular" instead of "Device". The column covers geometric shape of a box.
3. Editorial revision: In a 344 cubic cm box 4 # 6 conductors are allowed.

Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

The purpose of this table is to provide a conversion from trade size to internal volume for metal boxes that are not marked with their internal volume. Conversely nonmetallic boxes are not referred to by trade size and have their internal volume marked on the inside of the box so the table does not apply.

The names shown in the table are common terms used in the trade to describe the boxes.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-26 Log #1318 NEC-P09 **Final Action: Accept**
(314-16(B)(1), and 314.16(C)(2))

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Replace the term "computed" with the term "calculated" in the following sections:
314.16(B)(1)
314.16(C)(2)

Substantiation:

This proposal is the result of an effort by the NEC Usability Task Group to standardize the language throughout the NEC relative to the use of the terms computed and calculated. After analyzing the usage, the group agreed that the term "calculated" was the best term for use throughout the NEC. This is one in a series of proposals to standardize on the term calculated.

The term "calculate" and its derivatives is presently used in the article title, section titles, and throughout portions of the existing article. Other Articles of the NEC such as for calculating conductor ampacties (under engineering supervision), calculating the size of enclosures, and in Annex D use the term calculate. Additionally, the term "calculate" is more commonly used in other NFPA codes and standards e.g. NFPA 70E, arc flash calculation. Adversely, the term "computation" has a connotation of using a computer, although "load calculations" are frequently determined using a calculator. It appears that the term "computation" was used more frequently beginning with the 1975 NEC based on an editorial revision project.

Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

9-27 Log #3315 NEC-P09 **Final Action: Reject**
(314-16(B)(1))

Submitter: Sukanta Sengupta, FMC Corp.

Recommendation:

Revise 314.16(B)(1) to read as follows:
(1) Conductor Fill. Each conductor that originates outside the box and terminates or is spliced within the box shall be counted once, ~~and~~ each conductor that passes through the box without splice or termination shall be counted once, and each individual loop or coil of a conductor that passes through the box without splice or termination shall be counted once. The conductor fill shall be computed using Table 314.16(B). A conductor, no part of which the leave the box shall ~~not~~ be counted once.

Substantiation:

Loops, coils and interconnecting wire of a device in a box, that does not leave the box, occupy space. A box can be jammed up with current code's provisions. This can create a serious fire hazard when an electronic device is installed in a box without adequate room for its heat dissipation. Usage of electronic device is a common practice and is not isolated event any more; so the free space issue must be addressed by the code.

Panel Meeting Action: Reject

Panel Statement:

The code defines the required length of free conductors at outlets, junctions, and switch points in 300.14. It then makes allowances in volume for the defined lengths. While the additional wire may be good for future work it is undefined and therefore an allowance cannot be determined.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 8 Negative: 3

Explanation of Negative:

HARTWELL: The panel should have accepted this proposal in principle, revised as follows:
"(1) Conductor Fill. Each conductor that originates outside the box and terminates or is spliced within the box shall be counted once, and each conductor that passes directly through the box without splice or termination shall be counted once. A looped, unbroken conductor not less than 300 mm (12 in.) shall be counted twice. The conductor fill, in cubic inches, shall be computed using Table 370.16(B). A conductor, no part of which leaves the box, shall not be counted."
This revision properly distinguishes between a small loop left to assist wire pulling and dressing, and a large loop left to allow cutting in the middle and then adding a splice or a device. For such cases, a double volume allowance is appropriate. The panel rejected a more detailed version of this in the 2002 cycle, which referred to twice the length required by 300.14. This version is easier on the inspection community, since one foot is easy to judge.

OFFERDAHL: This proposal should have been "accepted in principle". The submitter raises a legitimate point where conductors are looped more than needed should be counted especially when the length is twice that of free conductor requirements of 300.14 should be counted twice. These conductors take up space in boxes, and if the conductors of this length were spliced, they would be counted twice. Where the boxes are sized to meet the minimum requirements of the present code language would result in additional code violations when the conductors are cut. If there were a lack of space in the existing box, the installer would create additional code violation by cutting, the conductors shorter than the requirements of 300.14 to accommodate the space in the box.
I suggest the section should read as follows:
(1) Conductor Fill. Each conductor that originates outside the box and terminates or is spliced within the box shall be counted once, and each conductor that passes through the box without splice or termination shall be counted once. A looped conductor that is twice the minimum length requirements of 300.14 shall be counted twice. The conductor fill shall be computed using Table 314.16(B). A conductor, no part of which leaves the box, shall not be counted.

SENGUPTA: CMP should accept the proposal based on its own panel statement for rejection.
300.14 does not define maximum length of a conductor allowed in a box; it defines the minimum length requirement. Also, the loop or coil of a conductor to be considered for this proposal is excluded from 300.14 (300.14 Exception).
On a technical basis, rejection of this proposal neglects the fact that a conductor placed in a box in form of coils or loops occupies a space and the volume of the occupied space varies depending on number of loops or coils. Inclusion of a conductor, longer than that required by 300.14, in multiple loops or coils in a box is not an uncommon practice. By this panel action, any length of a cable in multiple loops can be installed filling free space of a box without code violation.

9-28 Log #1884 NEC-P09 **Final Action: Reject**
(314-16(B)(1) Exception)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
Exception: An equipment ~~grounding~~ bonding conductor or conductors or not over four luminaire (fixture) wires smaller than 14 AWG, or both, shall be permitted to be omitted from the calculations where they enter a box from a domed luminaire (fixture) or similar canopy and terminate within that box.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

See the panel statement on Proposal 9-1 (Log #2453i).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-29 Log #2063 NEC-P09 **Final Action: Reject**
(314-16(B)(1) Exception (New))

Submitter: Michael L. Last Na'alehu, HI

Recommendation:

Add text to read as follows:
Exception: Where a conductor would not otherwise be considered spliced or terminated, the use of an insulation displacement connector on that conductor, shall not be considered a splice or termination that conductor. A conductor that passes through the box with only an insulation displacement connector attached thereto, shall be counted once.

Substantiation:

An insulation displacement connector makes contact with a conductor by piercing the insulation (if present), and without severing any of the conducting material. Therefore, the integrity and continuity of the conducting media is not compromised. The size of an insulation displacement connector is such that it requires less volume than any other type of splicing means. Upon the removal of an insulation displacement connector, no additional procedure is required to return the conductor to the condition existing prior to the installation of the insulation displacement connector. Other types of splicing means require the conducting material to be severed and then spliced. Removal of other types of splicing means requires an additional procedure to return the conductor to the condition existing prior to the installation of the splicing means.

Panel Meeting Action: Reject

Panel Statement:

In order to physically make the splice, a splicing device must be used and an additional conductor length will be required. This additional conductor length and splicing device will occupy space in the box.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-30 Log #2064 NEC-P09 **Final Action: Reject**
(314-16(B)(1) Exception (New))

Submitter: Michael L. Last Na'alehu, HI

Recommendation:

Add text to read as follows:
Exception: Any conductor that has none of its strands severed, shall not be considered as being either spliced or terminated. The use of insulation displacement connectors or other means on a conductor which only pierces the insulation (if any is present), but leaves all strands of the conducting media intact shall not be considered as splicing or terminating that conductor.

Substantiation:

It is unclear whether the use of an insulation displacement connector, or other means which make contact with a conductor, without severing any of the conducting media, is a splice and/or termination. This proposal will eliminate any uncertainty.

Panel Meeting Action: Reject

Panel Statement:

See the panel statement on Proposal 9-29 (Log #2063).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-31 Log #1236 NEC-P09 **Final Action: Reject**
(314-16(B)(2))

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
(2) Clamp Fill. Where one or more internal cable clamps, ~~whether factory or~~ that are field supplied, are present in the box, a single volume allowance in accordance with Table 314.16(B) shall be made based on the largest conductor present in the box. No allowance shall be required for a cable connector with its clamping mechanism outside the box.
Outlet boxes that are factory supplied with one or more internal cable clamps and where the outlet box is marked with the actual volume shall not be required to deduct the cable clamp fill.

Substantiation:

Outlet boxes should show the exact volume with all clamps in place. Currently when a NRTL determines the volume of an outlet boxes they are required to remove all the clamps. This way of measuring does not show the true volume of an outlet box. In addition, the current method requires the contractors and inspectors to deduct the clamps in the field which is not user friendly and can lead to interpretation and calculation errors.

Panel Meeting Action: Reject

Panel Statement:

This rule specifies a deduction for the volume occupied by the clamps when the box is wired. This deduction must be made regardless of when the clamps are installed.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: The objective of the requirement is to anticipate the volume of the internal clamp while it is in use, not while it is at the testing laboratory for a listing evaluation. As soon as a cable enters the box at an internal clamp, the box volume occluded by the clamp and its contained cable increases, and the justification for counting the internal clamp as a conductor applies. This is different from a conventional connector that holds the cable assembly outside the box, and for which minimal cable materials enter the box. The methodology now used by the testing laboratories to evaluate the volume of nonmetallic boxes is appropriate. Although it is true that some connector designs allow Type NM cable to enter a box in indefinite lengths, 314.14 operates to discourage that practice because the installer doesn't get any credit for free conductor length until the cable jacket stops.

9-32 Log #2065 NEC-P09 **Final Action: Reject**
(314-16(B)(2))

Submitter: Michael L. Last Na'alehu, HI

Recommendation:

Add text to read as follows:
(2) Insulation Displacement Connectors. The use of insulation displacement connectors on a conductor shall not be considered a splice or termination of the conductor. Each conductor that passes through the box and has an insulation displacement connector attached, shall be counted once.

Substantiation:

It is unclear whether the use of an insulation displacement connector constitutes a splice or termination of the conductor to which it is affixed. A conductor that passes through a box with only an insulation displacement connector attached, could be considered as either one or two conductors. This proposal will eliminate any uncertainty.

Panel Meeting Action: Reject

Panel Statement:

See the panel statement on Proposal 9-29 (Log #2063).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-33 Log #435 NEC-P09 (314-16(B)(4)) **Final Action: Reject**

Submitter: Louis I. Baca, Auraria Higher Education Center

Recommendation:

Revise text as follows:
For dimmers, twist locks and GFCIs outlets devices a 3 volume allowance in according with Table 314-16(B) shall be based on the largest conductor connected to such devices.

Substantiation:

According with the following table, the volume increment percentage column of the listed devices below compared with a duplex receptacle commercial grade increases up to 54.2 percent.
Meaning that on these particular devices the total volume inside the box will be reduced by the same percentage, producing more heat due to lack of free air space inside the box, as well as difficulty to fit in these devices.
Therefore, the existing requirement to add 2 volume according with 1999 NEC. 370-16(B)(4) needs to be updated to a 3 volume allowance on these particular devices.

Insert Table Here

(Table shown on page 2737)

Panel Meeting Action: Reject

Panel Statement:

There is no technical substantiation to justify a change in the Code.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: The reason for the double conductor allowance for devices is to take into account the very issues raised in the proposal substantiation. Frequently the choice of a dimmer is a last-minute decision, and the NEC now avoids the necessity of breaking into finished walls at this point. This was why, in the 1990 cycle, CMP 9 instituted the universal double conductor allowance instead of only requiring this volume for larger devices. The submitter's substantiation could be used to justify returning to a single conductor allowance for other than dimmers and GFCIs, but not to support a triple allowance.

9-34 Log #2094 NEC-P09 (314-16(B)(4)) **Final Action: Reject**

Submitter: Robert Hagarty, RANDL Industries, Inc.

Recommendation:

Revise text to read as follows:
For each yoke or strap containing one or more devices or equipment, a double volume allowance in accordance with Table 314.16(B) shall be made for each yoke or strap based on the largest conductor connected to a device(s) or equipment supported by that yoke or strap. Device(s) greater than 8 in.^{3}, (131 cm^3), shall be calculated at 100 percent of their full volume and in no case shall the device(s) volume exceed 35 percent of the total volume of the box.

Substantiation:

[Text of Proposal 9-34 substantiation is shown on page 2342]

Panel Meeting Action: Reject

Panel Statement:

The devices shown in the submitter's substantiation do not have yokes or straps. Manufacturers should recommend box size in their installation instructions.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: The parent language in 314.16 ("of sufficient size") can always be used to address the problem cited in the substantiation. For enforcement purposes, I have always taken the position that such equipment that occupies the mounting area of two devices should be considered as such, resulting in a quadruple conductor allowance in this case.

9-35 Log #3493 NEC-P09 **Final Action: Reject**
(314-16(B)(5))

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
(5) Equipment Grounding Conductor Fill. Where one or more equipment ~~grounding~~ bonding conductors or equipment bonding jumpers enter a box, a single volume allowance in accordance with Table 314.16(B) shall be made based on the largest equipment ~~grounding~~ bonding conductor or equipment bonding jumper present in the box. Where an additional set of equipment ~~grounding~~ bonding conductors, as permitted by 250.146(D), is present in the box, an additional volume allowance shall be made based on the largest equipment ~~grounding~~ bonding conductor in the additional set.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

See the panel statement on Proposal 9-1 (Log #2453i).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-36 Log #2981 NEC-P09 **Final Action: Reject**
(314-16(B)(5) Exception (New))

Submitter: Sukanta Sengupta, FMC Corp.

Recommendation:

Add an exception to 314.16(B)(5) to read as follows:
Exception: An equipment grounding conductor or conductors or not over four luminaire (fixture) wires smaller than 14 AWG, or both, shall be permitted to be omitted from the calculations where they enter a box from a domed luminaire (fixture or similar canopy and terminate within that box.)

Substantiation:

Relocated from 316.16(B)(1).

Panel Meeting Action: Reject

Panel Statement:

The principal application of the exception is to current carrying conductor fill, because all luminaires have energized conductors. The equipment grounding conductor provisions are not applicable to all luminaires, and are fewer in number than the current-carrying conductors. The existing exception is properly located.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-37 Log #1036 NEC-P09 **Final Action: Reject**
(314-17)

Submitter: Glenn W. Zieseniss Crown Point, IN

Recommendation:

Add ( ) around the "s" of the word "Conductors" in the title line and the first word of the text so as to read:
314.17 Conductor(s) Entering Boxes, Conduit Bodies, or Fittings. Conductor(s) entering...".

Substantiation:

The word conductors indicates that there must be more than one conductor so as to require to be secured to the box, etc. The second sentence of 314.17(B) indicates any wiring entering the box is required to be "firmly secured to the box...". This change would indicate that any conductor(s), one or more, is required to be secured to the box. Grounding Electrode Conductor(s) (GEC) are usually single conductor and should be required to be secured to the box so that any stress placed on the GEC on the exterior of the enclosure will not be transmitted to the termination of the conductor inside the enclosure. Example, a lug secured to the enclosure in a horizontal position with the conductor vertically down through an open hole could easily be loosened if stress is placed on the unsecured conductor where it enters the enclosure.

Panel Meeting Action: Reject

Panel Statement:

See the panel statement on Proposal 9-6 (Log #1037).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-38 Log #102 NEC-P09 **Final Action: Accept**
(314-17(B))

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
"... are installed with open wiring on insulators or concealed knob-and-tube...".

Substantiation:

This is one of a series of proposals to provide consistency throughout the code in the use of the terms "exposed", "open wiring", and "open runs" as applied to wiring methods.
"Exposed" is used 306 times throughout the code, "open runs" is used 7 times, and "open wiring" is used 29 times but only 10 of those instances do not refer to "open wiring on insulators".
Exposed is defined in Article 100 as shown below.
"Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated or insulated."
"Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access."
Open wiring on insulators is defined in 398.2 as "An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings."
"Open runs" is not defined in the code.
This series of proposals will limit the term "open wiring" to open wiring on insulators (Article 398) and have the term "exposed" apply to "open runs" and open wiring not on insulators.

Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

9-39 Log #2913 NEC-P09 **Final Action: Accept**
(314-17(B))

Submitter: Dorothy Kellogg, American Chemistry Council

Recommendation:

Add the words "on insulators" and "messenger supported wiring" as shown:
(B) Metal Boxes and Conduit Bodies. Where metal boxes or conduit bodies are installed with, messenger supported wiring, open wiring on insulators or concealed knob-and-tube wiring,..."

Substantiation:

The phrase "open wiring" appears more than 30 times in the current 2002 NEC, but it exists in two distinct formats: a) as the defined term "open wiring on insulators" by Article 398.2, or b) simply as the undefined term "open wiring'. With the defined term, open wiring makes reasonable sense. However when used as the undefined term "open wiring", especially when used to describe a cable that is required to have mechanical integrity and protection takes on an entirely different meaning. Clearly such an installation is not "open". Due to the significant difference in the use of the terms, this and associated other proposals if accepted would replace the undefined use of the term "open wiring" with more appropriate language that addresses the installation in 501.4(B)(1)(5), 501.5 Exception No. 2; 503.3(B); 504.30(A)(1); 505.15(C)(1)(c); 505.16(C)(1) Exception No. 2; 610.12(A); 725.61(D)(4); and 727.4(4)(5)(6), and use the full 398.2 defined term where the text suggests as in 300.16(A); 312.5(B); 314.17(B); 314.17(C). Again, individual proposals have been submitted to address each section mentioned. Since the concept of open wiring may also have permitted messenger supported wiring, with this change, this term has been added.

Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

9-40 Log #103 NEC-P09 **Final Action: Accept**
(314-17(C))

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
"... are used with open wiring on insulators or concealed knob-and-tube...".

Substantiation:

This is one of a series of proposals to provide consistency throughout the code in the use of the terms "exposed", "open wiring", and "open runs" as applied to wiring methods.

"Exposed" is used 306 times throughout the code, "open runs" is used 7 times, and "open wiring" is used 29 times but only 10 of those instances do not refer to "open wiring on insulators".

Exposed is defined in Article 100 as shown below.

"Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated or insulated."

"Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access."

Open wiring on insulators is defined in 398.2 as "An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings."

"Open runs" is not defined in the code.

This series of proposals will limit the term "open wiring" to open wiring on insulators (Article 398) and have the term "exposed" apply to "open runs" and open wiring not on insulators.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-41 Log #1396 NEC-P09 **Final Action: Reject**
(314-17(C))

Submitter: Lanny G. McMahill Phoenix, AZ

Recommendation:

Add new text as follows:

(C) Nonmetallic Boxes and Conduit Bodies. Nonmetallic boxes and conduit bodies shall be suitable for the lowest temperature-rated conductor entering the box. Nonmetallic boxes and conduit bodies shall not be used where any combination of ambient and conductor temperature produces an operating temperature in excess of that for which the material is approved. Where nonmetallic boxes and conduit bodies are used with open wiring or concealed knob-and-tube wiring, the conductors shall enter the box through individual holes.

Substantiation:

Nonmetallic boxes and conduit bodies have a 90°C temperature rating. Many enforcement officials are of the understanding that higher temperature rated conductors cannot be installed in the nonmetallic boxes and conduit bodies, and the maximum temperature rated conductor that can be installed is 90°C. The new text should help clarify the intent of the section. The lowest temperature-rated conductor entering the box is the lowest temperature rating of any connected termination, conductor, or device.

Panel Meeting Action: Reject

Panel Statement:

The requirement as written is clear and enforceable. The temperature rating of the material for the box and fitting is readily available and the conductors are marked. The proposed addition will make enforcement very difficult.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: The submitter appears to be saying that some inspectors are enforcing this section as though it were written "… suitable for the highest temperature-rated conductor …" Someone who applies a rule that says "lowest" as if the word were "highest" will not be impressed by a change in the Code, whether as proposed by the submitter or under any other version of a written code.

9-42 Log #2914 NEC-P09 **Final Action: Accept**
(314-17(C))

Submitter: Dorothy Kellogg, American Chemistry Council

Recommendation:

Revise as follows:
(C) Nonmetallic Boxes and Conduit Bodies. Nonmetallic boxes and conduit bodies shall be suitable for the lowest temperature-rated conductor entering the box. Where nonmetallic boxes and conduit bodies are used with messenger supported wiring, open wiring on insulators or concealed knob-and-tube wiring,the conductors shall enter the box through individual holes.

Substantiation:

The phrase "open wiring" appears more than 30 times in the current 2002 NEC, but it exists in two distinct formats: a) as the defined term "open wiring on insulators" by Article 398.2, or b) simply as the undefined term "open wiring'. With the defined term, open wiring makes reasonable sense. However when used as the undefined term "open wiring", especially when used to describe a cable that is required to have mechanical integrity and protection takes on an entirely different meaning. Clearly such an installation is not "open". Due to the significant difference in the use of the terms, this and associated other proposals if accepted would replace the undefined use of the term "open wiring" with more appropriate language that addresses the installation in 501.4(B)(1)(5), 501.5 Exception No. 2; 503.3(B); 504.30(A)(1); 505.15(C)(1)(c); 505.16(C)(1) Exception No. 2; 610.12(A); 725.61(D)(4); and 727.4(4)(5)(6), and use the full 398.2 defined term where the text suggests as in 300.16(A); 312.5(B); 314.17(B); 314.17(C). Again, individual proposals have been submitted to address each section mentioned. Since the concept of open wiring may also have permitted messenger supported wiring, with this change, this term has been added.

Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

9-43 Log #686 NEC-P09 **Final Action: Accept in Part**
(314-20)

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise:
In Walls ~~or~~ Ceilings, or Floors. In walls, ~~or~~ ceilings, or floors with a surface of concrete, tile, gypsum, plaster, or other noncombustible material, boxes shall be installed so the front edge of the box, plaster ring, domed cover, extension ring, or listed extender shall not set back of the finished surface more than 6 mm (1/4 in.)
In walls ~~and~~ ceilings, and floors constructed of wood or other combustible surface material, boxes, plaster rings, domed covers, extension rings, or listed extenders shall be flush with the finished surface or project thereform.

Substantiation:

Plaster rings, extension rings, and the like are not boxes. Where such appurtenances more than 1/4 in. deep are installed to be flush with the finish surface the front edge of the box will necessarily be recessed more than 1/4 in. The proposal recognizes the use of extenders and covers installations in floors; standard boxes are permitted by 314.27(D), Exception for floor installations.

Panel Meeting Action: Accept in Part

The panel accepts the addition of plaster ring, domed cover, extension ring, or listed extender in two places.
The panel rejects the addition of the text for floors.

Panel Statement:

Floor boxes must be located per the manufacturer's instructions in order to provide a safe installation.

Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

9-44 Log #926 NEC-P09 **Final Action: Reject**
(314-20)

Submitter: John M. Vargo, Vargo Electric

Recommendation:

Revise text as follows:
314.20 In Wall, ~~or~~ Ceiling or Floor.
In walls, ~~or~~ ceilings or floors constructed of wood or other combustible surface material, boxes shall be flush with the finished surface or project therefrom.

Substantiation:

This would include floor boxes for outlets that heretofore were not included.

Panel Meeting Action: Reject

Panel Statement:

See the panel statement on Proposal 9-43 (Log #686).

Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

9-45 Log #3206 NEC-P09 **Final Action: Reject**
(314-20)

Submitter: Fred W. Brown, HI Electron

Recommendation:

Delete the words "gypsum, plaster" in 314.20.

Substantiation:

Gypsum and plaster are not considered as noncombustible in the fire codes. These are used as part of a listed fire resistive assembly. The National Electrical Code, by the way of 90.4 allows the authority having jurisdiction to waive specific requirements in the NEC where it is assured that equivalent objectives can be achieved. The present wording puts the effectiveness of the energy and fire codes at risk of being diminished.

Panel Meeting Action: Reject

Panel Statement:

Gypsum and plaster are considered noncombustible materials for the purposes of the National Electrical Code.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: Although these materials may not meet all the noncombustibility requirements for some purposes, they are sufficiently noncombustible to meet the objectives of this rule. I am unaware of any credible loss experience traceable to electrical ignition of gypsum board in the context of this requirement. Nothing in this rule conflicts with the fire separation principles of 300.21, and therefore there is no affect on the application of Fire Codes. Energy codes, for NEC purposes, are design issues unrelated to the code objectives expressed in 90.1.

9-46 Log #1840 NEC-P09 **Final Action: Reject**
(314-20 Exception (New))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add an exception to read as follows:
Exception: Where the box, device, and cover mate to create a complete enclosure, it shall be permitted to be recessed in a cavity wall the full depth of the wall finish.

Substantiation:

This is a commonly accepted practice. The two risks associated with recessed enclosures have to do with inadequate access by workers to their contents and with heat and sparks getting out or extraneous matter getting in. If recessing is limited to the depth of the drywall, or even lath and plaster or paneling, we're not making the contents appreciably harder to get at during troubleshooting, device replacement, or repair. If it's limited to cases where the cover mates tightly against the box, the contents remain secure in use.

Panel Meeting Action: Reject

Panel Statement:

The current code text addresses the submitter's concerns. The submitter has not provided adequate substantiation that a problem exists.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

HARTWELL: In drafting my comment on affirmative vote on Proposal 9-14, I realized that the Panel probably should have accepted this in some form. Rather than create a stand-alone exception, 314.20 could have the words "employing a flush-type cover or faceplate" added after the word "boxes" in the first paragraph. Just as in the case of surface panels that are recessed to some degree, it seems excessive to specify a surface-setback limitation for a box arrangement that assumes no surface treatment need be brought to it in the first place. The accessibility issues raised in the substantiation are adequately addressed in 314.29.

9-47 Log #970 NEC-P09 **Final Action: Reject**
(314-21)

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Remove this section entirely.

Substantiation:

Where an enclosure is recessed in a combustible surface and the cover is not similarly recessed so as to mate with it, there is a potential fire hazard. However, that construction is illegal anyway per Section 314.20. I have seen no other substantial safety justification for the requirement in Section 314.21, and tidiness is not akin to godliness. What happens, anyway, to this requirement when a low-voltage device is installed in the wall, without enclosure, next to a 120 volt receptacle or switch box? There are Listed enclosures, such as T & B's "Union (R) Dual Voltage Boxes," that leave cubic inches of unsealed access to the interior of the wall alongside the 120 volt enclosure, hidden only by the cover plate. That box passes UL's tests (File #E9140). It could not be legal if it were unsafe to use it as designed. Furthermore, if there were a safety justification for this finish-repair requirement, it probably should apply to Article 312 as well, and parallel wording is absent there. See my paired proposal to add such, if this really, truly is a safety issue.

Panel Meeting Action: Reject

Panel Statement:

This requirement addresses a safety issue. If the gap around the box extends beyond the outside edge of the faceplate, access to the live parts could be created.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: If equipment as described in the substantiation is becoming generally available, UL (and others) should pursue a file review to determine whether the objectives of this section are being met. The panel discussion indicated familiarity with some such covers that would allow for wall repairs, but the discussion was not comprehensive.

9-48 Log #3205 NEC-P09 **Final Action: Reject**
(314-21)

Submitter: Fred W. Brown, HI Electron

Recommendation:

Delete section 314.21.

Substantiation:

This section is being used for an automatic allowance in new construction to leave a 3 mm (1/8 in.) gap around boxes and fittings. I believe the original purpose was to allow the 3 mm (1/8 in.) gap for installation boxes and fittings, after the plaster drywall or plasterboard had been installed not before. This article puts the effectiveness of the energy and fire codes at risk of being diminished.

Panel Meeting Action: Reject

Panel Statement:

See the panel statement on Proposal 9-47 (Log #970).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-49 Log #971 NEC-P09 **Final Action: Reject**
(314-21 Exception (New))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add the following exception:
Exception: Where the front edge of the box is not recessed, and mates with the box cover to form a complete enclosure, such repair shall not be required.

Substantiation:

The only safety justification I have heard for the requirement in Section 314.21 is that air from inside the wall could enter through such a gap and support combustion. I don't know whether this is a truly credible risk, but certainly it only is present where the five sides of the electrical box do not contact the cover to block such access.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not supplied technical substantiation to justify the change.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

HARTWELL: In drafting my Comment on Affirmative vote on Proposal 9-14, I realized that the Panel probably should have accepted this in some form. Rather than create a stand-alone exception, 314.21 could have the words "around boxes employing a flush-type cover or faceplate" added after the word "incomplete". Just as in the case of surface panels that are recessed to some degree, it seems excessive to require surface repairs around a box arrangement that assumes no surface treatment need be brought to it in the first place.

9-50 Log #596 NEC-P09 **Final Action: Accept in Principle**
(314-23(B)(1))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
Nails and screws, where used as a fastening means, shall be attached by using brackets on the outside of the enclosure, or they shall pass through the interior within 6 mm (1/4 in.) of the back or ends of the enclosure. Screws shall not be permitted to pass through the box unless exposed threads in the box are adequately protected to avoid abrasion of conductor insulation.

Substantiation:

Coarse screw threads found on most screws used for mounting boxes, when left exposed inside a box, present a severe abrasion hazard to conductor insulation.

Panel Meeting Action: Accept in Principle

Revise the submitter's text to read as follows:
"Screws shall not be permitted to pass through the box unless exposed threads in the box are protected using approved means to avoid abrasion of conductor insulation."

Panel Statement:

This change meets the intent of the submitter and conforms to the NEC Style Manual.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-51 Log #157 NEC-P09 **Final Action: Reject**
(314-23(D)(2))

Submitter: W. Creighton Schwan Hayward, CA

Recommendation:

Panel 9, please get together with Panel 3 to resolve this conflict:
314.23(D)(2), in part "...Support wires used for enclosure support shall be fastened at each end so as to be taut within the ceiling cavity."
300.11(A)(1) and (A)(2): "wiring...shall not be secured to...the ceiling assembly."

Substantiation:

It is impossible to comply with both of these requirements.

Panel Meeting Action: Reject

Panel Statement:

There is no conflict between Article 314 and Article 300 with regard to support wires used for enclosure support. Listed support devices are available for this application for boxes and enclosures. See Exception 300.11(A)(1).

There is no conflict, and there was adequate communication between CMP 3 and 9 at the time the requirement was written. The support wires in 300.11 that are available for box support are those installed over and beyond those required for the ceiling design. In the case of rated floor/ceiling designs, the requirements are so critical that the required ceiling support wires must be readily distinguishable from others. In any suspended ceiling, however, (unless one of the exceptions apply) boxes and other wiring must stay off the minimum designed ceiling support wires. Article 314 then imposes the additional rule that to be eligible for box support, those additional support wires must be taut.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-52 Log #836 NEC-P09 **Final Action: Accept**
(314-23(F))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise first sentence:
An enclosure that contains a device(s), other than splicing devices, or supports a... (remainder unchanged).

Substantiation:

Edit. Wire connectors are devices, although not the type intended by this rule. Subsection (E) uses the phrase proposed, to distinguish this requirement. Per the Style Manual similar requirements should be stated in similar ways to avoid confusion.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-53 Log #2406 NEC-P09 **Final Action: Reject**
(314-23(F))

Submitter: Bryan Coak, Springs & Sons Electric

Recommendation:

After "two or more conduits threaded wrenchtight into the enclosure or hubs." insert "A threadless connector approved for the purpose, may be used to connect one of the required conduits into the enclosure or hub."

Substantiation:

When running rigid metal or intermediate metal conduit underground between several boxes such as for receptacles in the back yard of a residential occupancy, a threadless connector would be plenty adequate to support the box when the two conduits are turned up and one conduit threaded into the box and the other fastened with a threadless fitting. It is impossible to thread two conduits into a box when they are coming out of a trench and 90'd up.

Panel Meeting Action: Reject

Panel Statement:

The rule requires two threaded entries. A threadless connector is not as strong as conduit threads. If both conduits cannot be threaded into the box, then a three piece coupling or union and a short threaded nipple can be installed, or the box independently supported.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-54 Log #1103 NEC-P09 **Final Action: Reject**
(314-23(F) Exception No. 2 (f))

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Insert wording at end of last sentence:
"...nipple not over 75 mm (3 in.) long, or to a cover that is secured to the box."

Substantiation:

Many luminaires are designed to be installed into a threaded opening, and are often threaded into covers that have threaded openings, and then the cover is secured to the box.

Panel Meeting Action: Reject

Panel Statement:

A cover will be secured with (typically) two No. 8-32 screws, or even smaller. This does not compare in strength to a threaded pipe nipple. One solution is to use a box with threaded hubs on opposite sides. This allows threaded conduit throughout as the support method, and also allows for access to the box.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: A threaded cover that is provided as part of a listed luminaire can be secured with the outlet box screws. The restrictions in the exception are for field wiring and don't apply to the construction of luminaires governed by UL 1598, even luminaires employing pipe stems in their make-up.

9-55 Log #1237 NEC-P09 **Final Action: Reject**
(314-27(C))

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
(C) Floor Boxes. Boxes listed specifically for this application shall be used for receptacles located in the floor.
~~Exception: Where the authority having jurisdiction judges them free from likely exposure to physical damage, moisture, and dirt, boxes located in elevated floors of show windows and similar locations shall be permitted to be other than those listed for floor applications. Receptacles and covers shall be listed as an assembly for this type of location.~~

Substantiation:

This exception should be deleted. Affordable floor boxes are available on the market. These listed floor boxes are the size of a single outlet box and utilize a cover that will prevent moisture from cleaning getting into the receptacle and causing corrosion. The AHJ should rely on the listing of the floor box.

Panel Meeting Action: Reject

Panel Statement:

There is no evidence of a problem or potential safety hazard.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-56 Log #835 NEC-P09 **Final Action: Reject**
(314-27(C) Exception)

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Add to exception:
The requirements of 314.20 shall apply.

Substantiation:

Where standard type boxes are used, these requirements should apply, which presently do not cover installations in floors.

Panel Meeting Action: Reject

Panel Statement:

The receptacles and covers listed for this type of location provide instructions for the installation of the outlet box.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-57 Log #569 NEC-P09 **Final Action: Accept in Principle**
(314-27(D))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise and add new text as follows:
(D) Boxes at Ceiling-Suspended (Paddle) Fan Outlets.
~~Where a~~ Listed outlet boxes or outlet box systems ~~is~~ used as the sole support of a ceiling-suspended (paddle) fan, shall be identified for the purpose. ~~the box shall be listed for the application and for the weight of the fan to be supported. The installation shall comply with 422.18.~~

Listed outlet boxes or outlet box systems installed as required by 314.23 shall be permitted to support ceiling-suspended (paddle) fans, with or without accessories, weighing 16 kg (35 lb) or less.

Listed outlet boxes or outlet box systems installed as required by 314.23 shall be permitted to support ceiling-suspended (paddle) fans, with or without accessories, weighing more 16 kg (35 lb) but no greater than 32 kg (70 lb), when the outlet box is identified with the weight permitted to be supported.

Substantiation:

This proposal has a companion proposal for 422.18, to remove the current box supported Ceiling-Suspended (Paddle) Fans requirements and add a reference in 422.18 referring to 314.27(D). Supporting requirements for outlet boxes belong in Article 314. This change eliminates users from having to refer to two sections in the code to determine if and what size Ceiling-Suspended (Paddle) Fans is permitted to be supported by an outlet box.

Panel Meeting Action: Accept in Principle

Accept the relocation of material. Reword as follows:

"Outlet boxes or outlet box systems used as the sole support of a ceiling-suspended (paddle) fan shall be listed, shall be marked by their manufacturer as suitable for this purpose, and shall not support ceiling-suspended (paddle) fans that weigh more than 32 kg (70 lb). For outlet boxes or outlet box systems designed to support ceiling-suspended (paddle) fans that weigh more than 16 kg (35 lb) the required marking shall include the maximum weight to be supported."

Panel Statement:

The panel prefers simpler language that also addresses the fact that the current NEC wording in Article 422 does not actually forbid the use of even heavier weights than supposed NEC maximums.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-58 Log #598 NEC-P09 **Final Action: Reject**
(314-27(E) (New))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Add text to read as follows:
(E) Wall Outlet Boxes Installed in a Ceiling. A single gang outlet box no larger than a nominal size 57 mm X 100 mm (2 1/4 in. x 4. in.) shall be permitted to be installed in a ceiling for the purpose of mounting a device, smoke detector, carbon monoxide detector or a similar product weighing 3 kg (6 lb) or less, and secured with no fewer than two No. 6 or larger screws.

Substantiation:

This proposal clarifies the use of single gang outlet boxes in the ceiling. Single gang outlet boxes are used for receptacles in the ceilings for garage door openers. These boxes are also used for both smoke and carbon monoxide detectors.

Panel Meeting Action: Reject

Panel Statement:

The NEC text as written does not prohibit the proposed installation. The only restriction is on luminaires, which normally require 8-32 mounting screws, and which required the relief in 314.27(A) Exception. The equipment cited in the substantiation can be mounted on ceilings, even to device boxes with 6-32 screws. No change in the Code is required. CMP-9 recognizes confusion with regard to this issue and recommends coverage in the NECHB.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: A smoke detector is admittedly not a device, but utilization equipment. However, 314.27(A) is limited to luminaire applications, because they often come in sizes that multiply the affects of weight alone through leverage. A smoke detector or similar does not present this type of issue. For now, the only limit on the weight of utilization equipment would be that found in installation instructions. There is absolutely no support in the Code for an interpretation prohibiting the horizontal, downward orientation of a device box. Code-Making Panel 9 may need to review whether the scope of this section should be broadened in a future code cycle; however, I seriously doubt such a review would lead to a prohibition against the thoroughly innocuous examples cited in this proposal. Remember, a pure device such as a receptacle will certainly continue to be permissible, and the pull-out force to withdraw a plug from a high-quality receptacle would exceed the 6-lb. limit in 314.27(A) Exception (presently limited to wall-oriented device boxes.).

9-59 Log #1238 NEC-P09 **Final Action: Reject**
(314-27(E))

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Add new text to read as follows:
(E) Outlet Boxes in a Ceiling. Single gang outlet boxes not larger than 57mm x 100mm (2 1/4 in. x 4 in.) and round or octagonal outlet boxes not larger than 100mm (4 in.) in diameter are permitted to be installed in a ceiling for receptacles, smoke detectors or any device not defined as a luminaire and that weighs 3 kg (6 lbs) or less.

Substantiation:

This is for clarification. Single gang boxes are permitted to be installed in a ceiling per 314.17(C) Exception. 314.17 defines conductors entering outlet boxes where as this new text makes it clear and user friendly that these types of boxes are permitted in the ceiling. Round or octagonal boxes listed as outlet boxes and are not marked for Luminaire support should not be excluded from this rule.

Panel Meeting Action: Reject

Panel Statement:

See panel action and statement on 9-58 (Log #598).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-60 Log #2328 NEC-P09 **Final Action: Reject**
(314-28)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA) / Rep. NEMA

Recommendation:

Revise text as follows:

Pull and Junction Boxes and Conduit Bodies. Boxes and conduit bodies used as pull or junction boxes shall be listed for the purpose, and comply with 314.28(A) through (D).

Exception: Terminal housings supplied with motors shall comply with the provisions of 430.12.

Listed boxes or conduit bodies intended for use with combinations of conductors permitted by Table 1 of Chapter 9 and that are less than the maximum fill that the attached raceways will accommodate, shall be permanently marked with the maximum number and maximum size of conductors permitted.

(A) Minimum. For raceways containing conductors of 4 AWG or larger, and for cables containing conductors of 4 AWG or larger, the minimum dimensions of pull or junction boxes installed in a raceway or cable run shall comply with the following. ~~Where an enclosure dimension is to be calculated based on the diameter of entering raceways, the diameter shall be the metric designator (trade size) expressed in the units of measurement employed.~~

(1) Straight Pulls. In straight pulls, the length of the box shall allow adequate space to ensure the maximum size conductor which the raceway will accommodate is not over-bent, as defined in 312.6, during installation ~~not be less than eight times the metric designator (trade size) of the largest raceway~~.

(2) Angle or U Pulls. Where splices or where angle or U pulls are made, the distance between each raceway entry inside the box and the opposite wall of the box shall allow adequate space to ensure the maximum size conductor which the largest raceway will accommodate is not over-bent, as defined in 312.6, during or after installation ~~not be less than six times the metric designator (trade size) of the largest raceway in a row. This distance shall be increased for additional entries by the amount of the sum of the diameters of all other raceway entries in the same row on the same wall of the box. Each row shall be calculated individually, and the single row that provides the maximum distance shall be used~~.

Exception: Where a raceway or cable entry is in the wall of a box or conduit body opposite a removable cover, the distance from that wall to the cover shall be permitted to comply with the distance required for one wire per terminal in Table 312.6(A).

~~The distance between raceway entries enclosing the same conductor shall not be less than six times the metric designator (trade size) of the larger raceway. When transposing cable size into raceway size in 314.28(A)(1) and (A)(2), the minimum metric designator (trade size) raceway required for the number and size of conductors in the cable shall be used.~~

~~(3) Smaller Dimensions. Boxes or conduit bodies of dimensions less than those required in 314.28(A)(1) and (A)(2) shall be permitted for installations of combinations of conductors that are less than the maximum conduit or tubing fill (of conduits or tubing being used) permitted by Table 1 of Chapter 9, provided the box or conduit body has been listed for and is permanently marked with the maximum number and maximum size of conductors permitted.~~

(B) Conductors in Pull or Junctions Boxes. In pull boxes or junction boxes having any dimension over 1.8 m (6 ft), all conductors shall be cabled or racked up in an approved manner.

(C) Covers. All pull boxes, junction boxes, and conduit bodies shall be provided with covers compatible with the box or conduit body construction and suitable for the conditions of use. Where metal covers are used, they shall comply with the grounding requirements of 250.110. An extension from the cover of an exposed box shall comply with 314.22, Exception.

(D) Permanent Barriers. Where permanent barriers are installed in a box, each section shall be considered as a separate box.

Substantiation:

The present prescriptive dimensional criteria are not practically enforceable in the field. Product standards for listed junction boxes, pull boxes and conduit bodies contain these dimensional requirements and compliance can better be determined at the time of listing. "Smaller Dimensions" boxes and conduit bodies are already required to be listed and make up the vast majority of Form 7 style conduit bodies on the market today. Prescriptive requirements that are not practically enforceable in the field should be removed from the Code and replaced by clear text that preserves the intent of the requirement for safety.

Panel Meeting Action: Reject

Panel Statement:

No listing procedure can account for all the ways that pull boxes are punched and applied in the field. A 12 x 12 pull box leaving a manufacturer may have trade size 2 raceways entering on adjacent sides, which would comply with the six-times rule, or the same box may have the same raceways punched on opposite sides, which would fail the eight-times rule. Furthermore, pull boxes are often made up in local sheet metal shops per 314.40(C) and UL 50 in order to solve particular field dimensional problems. It would be excessive to require these legitimate installations to be burdened with a listing requirement. CMP 9 discussed this issue during its extensive work on 314.40 in the 1993 cycle, and unanimously agreed at that time that a listing requirement for large pull boxes was unwarranted. The submitter has not presented any substantiation that would cause CMP 9 to revise its position.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: For the record, the action referenced in the Panel Statement is Comment 9-73 in the 1993 cycle. The panel action on large pull box listings at the meeting was unanimous and without controversy. The final action on the comment was also unanimous, but drew two abstentions due to the reprehensible threats of legal action on the part of the original proposal submitter, and serious deficiencies in the fact-finding report, both of which addressed an entirely different issue.

9-61 Log #2291 NEC-P09 **Final Action: Reject**
(314-28(A))

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panels 3 and 16 for action in their respective articles. This action will be considered by Code-Making Panels 3 and 16 as a public comment.

Submitter: Mark T. Rochon, City of Salem Electrical Department

Recommendation:

Revise text as follows:
(A) Minimum size for raceways carrying conductors of 4 AWG or larger, ~~and~~ for cables containing conductors of 4 AWG or larger and for low voltage or communication cable in excess of 6 mm (1/4 in.) the minimum dimensions of pull or junction best installed in a raceway or cable run shall comply with the following.

Substantiation:

Low voltage and communication cables are not being installed properly. Cables are being damaged twisted, because of the pull box not being in compliance with 314.28(1)(2) raceways 6 times for u pulls 8 times for straight pulls.

Panel Meeting Action: Reject

Panel Statement:

This issue is best handled in Article 725, 760 or Chapter 8. Communications cables, being comprised of smaller conductors, are more easily bent than power conductors of similar size, and therefore the same spacing requirements may not be appropriate. CMP 9 requests that the Technical Correlating Committee refer this proposal to CMP 3 and CMP 16 for action in Chapter 7, or 8, or both.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-62 Log #3440 NEC-P09 **Final Action: Reject**
(314-28(A)(1))

Submitter: Ralph Geater Osceola, WI

Recommendation:

Add text to read as follows:
When entering or leaving the back of a pull box using conductors #4 or larger, the depth of the pull box shall be calculated or determined by Table 316.6(A).

Substantiation:

Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

The Proposal does not carry any substantiation as required by NFPA Regulations Governing Committee Projects Section 4-3.3.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: It is difficult to imagine how 314.28(A)(1) could be applied to a pull from a bottom of a pull box. Note also that the intended table reference was presumably to 312.6(A).

9-64 Log #3441 NEC-P09 **Final Action: Reject**
(314-28(A)(2))

Submitter: Ralph Geater Osceola, WI

Recommendation:

Add text to read as follows:
When entering or leaving the back of a pull box using conductors #4 or larger, the depth of the pull box shall be calculated or determined by Table 312.6(A).

Substantiation:

None.

Panel Meeting Action: Reject

Panel Statement:

The Proposal does not carry any substantiation as required by NFPA Regulations Governing Committee Projects Section 4-3.3.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: Note that 314.28(A)(2) Exception provides what the submitter is apparently looking for.

9-63 Log #3035 NEC-P09 **Final Action: Reject**
(314-28(A)(2) & 312.6 (A))

Submitter: Carroll Lueck, Coors Brewing: Rocky Mountain Metal Container

Recommendation:

Conductors Under 600 V
Conductors # 4 and Larger
The conductors shall not be bent to a radius less than 6 times the overall diameter of the conductor.

Substantiation:

The NEC does not address a minimum bending radius for conductors under 600V.
Two recent problems involving a 3 in. conduit installation with 500 MCM conductors are used to illustrate the need to address this issue. One problem arose with the installation of a two 3 in. conduits with 500 MCM THHN Cu conductors run into the back of a 6 in. deep box. The conduit entries created a U-bend with all entries opposite a removable cover. The conduit and box configuration met the requirements of 314.28(A)(2), Exception with reference to 312.6(A).

<<<<Insert Artwork Here>>>>

312.6(A) requires a 6 in. minimum wire bending space in this application but does not specifically give a minimum wire bending radius. In this case the wire was bent tight enough to damage the askarel; a 2 in. - 3 in. radius. The 500 MCM cable was held in place in the box to allow easy cover mounting, thus also creating considerable mechanical pressure on the cable and the insulator bushing, enough to significantly dent the busing and the cable insulation allowing the possibility of increased deformation later with high, seasonal, ambient temperatures of 110° - 120°F. It was the damage to the askarel due to the tight bending radius that allowed for the enforcement of 110.7 to argue the correction.
The second problem was with a 90 degree application also with 3 in. conduit and 500 MCM cable. Instead of using the 8 in. box to make a smooth sweep, the wire again was bent tight (2 in. - 3 in. radius) and then looped in the box. The askarel was damaged in this installation as well.

<<<< Insert Artwork Here>>>>

It seems to be the intent of 314.28 to create an adequate bending space for the conductors but the exception reference to 312.6(A) seems to defeat the implied bending radius. The application of the exception opens the door for hard to enforce problems.
It is my desire that you will look at this problem and address a minimum bending radius for conductors under 600 V or reference the exception to 312.6(B) instead of 312.6(A). My desire is to see an acceptable, enforceable bending radius for conductors under 600 V.
This will also address some of the abuses of undersized condulets, i.e. bending radius in LB and T fittings.

Panel Meeting Action: Reject

Panel Statement:

The requirements in Section 314.28(A)(2) are dealing with sizing of enclosures not conductor requirements. Bending of conductors should only be limited by the conductor manufacturers instructions.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

HARTWELL: I have never seen "conductor manufacturer instructions" nor have I seen equivalent restrictions in the UL directories. I am not comfortable saying, at this point, that conductor insulation on large wires can be bent in the field as sharply as the strongest electrician can bend it, and would appreciate additional public comment from conductor manufacturers. If a rule is warranted, I suggest that it might take the following form: "In 314.28(A) insert a new numbered paragraph (4) as follows: '(4) Bending Radius. Conductors within pull or junction boxes and sized 4 AWG or larger shall not be bent to a radius less than the distance [or some percentage of that distance] required for one wire per terminal in Table 312.6(A).'"

9-65 Log #679 NEC-P09 **Final Action: Reject**
(314-28(C))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise last sentence: An extension from the cover of ~~an exposed~~ a flush-mounted box shall comply with 314.22, Exception.

Substantiation:

The exception for 314.22 relates to flush-mounted boxes. The definition of exposed covers boxes attached to the surface or behind panels. The difference in wording is confusing as to whether the intent is to permit extensions from the cover of an exposed surface mounted box.

Panel Meeting Action: Reject

Panel Statement:

This sentence deals with an extension on a surface mounted box. The reason for this sentence is to tie in the requirements included in 314.22 Exception so they will apply to cover extensions from surface mounted boxes. The current text is appropriate for this purpose.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-66 Log #2747 NEC-P09 **Final Action: Reject**
(314-28(E) (New))

Submitter: Phil Sutherland, Reedy Creek Improvement District

Recommendation:

Add a new paragraph (E)
314.28 (E). Conductors within buried enclosures shall not be exposed to the earth, unless the conductors and any splicing devices are listed for direct burial.

Substantiation:

It has become common practice, in some areas, to use buried, bottomless enclosures for concealment of, and to provide access to, splices or pull points in underground wiring systems consisting of Rigid Nonmetallic Conduit, and conductors and splicing means which are not listed for direct burial. This practice has led to the abrasion of conductors and premature deterioration of terminations, due to ponding water, and soil intrusion.

Panel Meeting Action: Reject

Panel Statement:

This subject is addressed in the new exception in Section 314.15. See panel action and statement on Proposal 9-23 (Log #1405). The requirements for conductor characteristics and splicing devices is in Section 300.15. Conductor characteristics within buried enclosures is not the scope of 314.28.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-67 Log #2828 NEC-P09 **Final Action: Reject**
(314-28(E) (New))

Submitter: Phil Sutherland, Reedy Creek Improvement District

Recommendation:

Add a new paragraph (E) to read as follows:
314.28(E) Conductors within buried enclosures shall not be exposed to the earth, unless the conductors and any splicing devices are listed for direct burial.

Substantiation:

It has become common practice, in some areas, to use buried, bottomless enclosures for concealment of, and to provide access to, splices or pull points in underground wiring systems consisting of rigid nonmetallic conduit, and conductors and splicing means which are not listed for direct burial. This practice has led to the abrasion of conductors and premature deterioration of terminations, due to ponding water, and soil intrusion.

Panel Meeting Action: Reject

Panel Statement:

See the panel action and statement on Proposal 9-66 (Log #2747).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-68 Log #1406 NEC-P09 **Final Action: Accept**
(314-29)

Submitter: Ronald E. Maassen, Lemberg Electric Co., Inc. / Rep. NECA

Recommendation:

Add text to read as follows:
Boxes, Conduit Bodies, and Handhole Enclosures to be Accessible. Boxes, conduit bodies, and handhole enclosures shall be installed so that the wiring contained in them can be rendered accessible without removing any part of the building or, in underground circuits, without excavating sidewalks, paving, earth, or other substance that is to be used to establish the finished grade.
Exception: Listed boxes and handhole enclosures shall be permitted where covered by gravel, light aggregate, or noncohesive granulated soil if their location is effectively identified and accessible for excavation.

Substantiation:

Adding handhole enclosures to 314.29 and its exception should be added for clarity.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-69 Log #1604 NEC-P09 **Final Action: Reject**
(314-30 (New))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add new text to read as follows:
Concealed boxes and conduit bodies shall be identified. The locations of boxes and conduit bodies that are concealed due to structural features shall be identified either by indicators in their immediate vicinity by notes at the sources of the circuits they feed, or at the next boxes or conduit bodies both immediately upstream and downstream from them.
Exception: Boxes and conduit bodies concealed behind access hatches or suspended ceiling panels.

Substantiation:

If a box is buried in gravel, you're not likely to find it except by sheer luck, or an immense amount of effort, without somebody marking the spot. Well, the same can be true of some boxes buried in attic insulation. The same can be true of boxes under attic flooring that is not nailed down. On one job I can name, a junction box is hidden in a drywall ceiling, but legal because it is accessible if you know to drop the can of the recessed light to which it is adjacent. Insist that installers paste a note on the panel, if nothing better, or these boxes might as well be plastered over.

Panel Meeting Action: Reject

Panel Statement:

Boxes that are covered by gravel, light aggregate, or noncohesive granulated soil are required to have their location identified per Section 314.29 Exception. Boxes and conduit bodies concealed by structural features of a building do not meet the requirements of Section 314.29.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: The Code already requires what the submitter wants to achieve. For example, 314.29 Exception requires "effectively identified". This is usually applied through a marking at the branch-circuit source for underground enclosures. Interior locations may require work and some amount of luck to find quickly, but there is a significant difference between exercising patience and needing to rip walls and ceilings open.

9-68a Log #CP904 NEC-P09 **Final Action: Accept**
(314-30)

TCC Action:

The Technical Correlating Committee directs that this proposal be referred to Code-Making Panel 3 for information.

Submitter: Code-Making Panel 9

Recommendation:

Add a new 314.30 as follows:
314.30 Handhole Enclosures. Handhole enclosures shall be listed and shall be designed and installed to withstand all loads likely to be imposed.
(A) Size. Handhole enclosures shall be sized in accordance with 314.28(A) for conductors operating at 600 volts or below, and in accordance with 314.71 for conductors operating over 600 volts. Where the provisions of 314.28(A)(2) Exception or 314.71(B)(1) Exception No. 1 apply, the measurement to the removable cover shall be taken from the end of the conduit or cable assembly.
(B) Wiring Entries. Underground raceways and cable assemblies entering a handhole enclosure shall extend into the enclosure, but they shall not be required to be mechanically connected to the enclosure.
(C) Covers. Handhole enclosure covers shall have an identifying mark or logo that prominently identifies their function, such as "electric." Handhole enclosure covers shall require the use of tools to open, or they shall weigh over 45 kg (100 lb). Metal covers and other exposed conductive surfaces shall be bonded in accordance with 250.96(A).

Substantiation:

Handhole enclosures are most comparable to pull and junction boxes, and the basic requirements belong in Article 314. This new section centralizes the field requirements in one place for user friendliness. CMP 9 is aware of the joint task group proposal submittals, but offers this as a way to complete the requirements appropriate for the NEC. CMP 9 is also aware that there is a task group proposal to include the listing, mechanical connection, and cover grounding requirements at 300.15. However, this material belongs in the article that already governs comparable enclosures, and not in a section primarily designed to address when enclosures are required. CMP 9 requests the TCC review the responsibility for this material.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

YOUNG: The panel should have voted to accept in part. Accept the proposal as proposed except remove the words "shall be listed" from the first sentence of 314.40. Then the sentence would read: "Handhole enclosures shall be designed and installed to withstand all loads likely to be imposed."
No technical substantiation was provided showing the need for listing of the enclosure. Properly designed boxes that are not listed will meet the intention of the first sentence. Refer to rejection of a similar requirement for listing in Proposal 9-60.

9-70 Log #1885 NEC-P09 **Final Action: Reject**
(314-40(D))

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
(D) Grounding Provisions. A means shall be provided in each metal box for the connection of an equipment ~~grounding~~ bonding conductor. The means shall be permitted to be a tapped hole or equivalent.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

See the panel statement on Proposal 9-1 (Log #2453i).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-71 Log #3210 NEC-P09 **Final Action: Reject**
(314-43 (New))

Submitter: Donald Berlin, Intermatic, Inc.

Recommendation:

Add a new part (B) to Section 314.43 to read as follows:
314.43 Nonmetallic Boxes.
(A) Mounting Provisions. Provisions for supports or other mounting means for nonmetallic boxes shall be outside of the box, or the box shall be constructed so as to prevent contact between the conductors in the box and the supporting screws.
(B) Grounding Provisions. A means shall be provided in each nonmetallic box for the connection of the equipment grounding conductor.

Substantiation:

Installation of various devices on nonmetallic boxes without integral grounding means provided in the box can result in ungrounded metal faceplates. The exception provided in 404.9(B) still allows the mounting screws to be ungrounded. Not all types of controls have integral grounding means. Products listed as industrial controls, energy management equipment, nonindustrial photoelectric switches, clock operated switches, and appliance controls are not required to have integral grounding means.
Rationale: Grounding of metal faceplates and plate mounting screws is required for safety. Nonmetallic outlet boxes are not currently required to have an integral grounding means, as is required for metal boxes. Industry manufacturers have UL listings for nonmetallic boxes with provisions for connecting the equipment grounding conductor to comply with the mandated Canadian requirements as per CSA C22.2, No. 18, Clauses 4.2.1.1 and 4.2.9.4. Several additional references to grounded nonmetallic boxes are in the NEC in 404.9(B) that indicates the need for integral means for grounding, 406.2(D) exception indicates the need for a grounded nonmetallic box. This revision would reduce the potential for improper grounding.

Panel Meeting Action: Reject

Panel Statement:

The current NEC requirements are adequate. 404.9(B) Exception provides a necessary allowance for switch replacements on circuits for which no grounding connection is possible. Even if this proposal were accepted, it would not address this issue, because with no equipment ground available, the box remains ungrounded, regardless of its internal construction. The Proposal raises conflicts with the Exceptions to 314.3.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-72 Log #3302 NEC-P09 **Final Action: Reject**
(314-43)

Submitter: Donald Berlin, Intermatic, Inc.

Recommendation:

Revise as follows:
(A) Provisions for supports or other mounting means for nonmetallic boxes shall be outside of the box, or the box shall be constructed so as to prevent contact between the conductors in the box and the supporting screws.
(B) Grounding Provisions. A means shall be provided in each nonmetallic box for the connection of an equipment grounding conductor.

Substantiation:

Problem: Installation of various devices on nonmetallic boxes without integral grounding means provided in the box can result in ungrounded metal faceplates. The exception provided in 404.9(B) still allows the mounting screws to be ungrounded. Not all types of controls have integral grounding means. Products listed as industrial controls, energy management equipment, nonindustrial photoelectric switches, clock operating switches, and appliance controls are not required to have integral grounding means.
Grounding of metal faceplates and plate mounting screws is required for safety. Nonmetallic outlet boxes are not required currently to have an integral grounding means, as is required for metal boxes. Industry manufacturer's have UL listings for grounded nonmetallic boxes, but are not available in the marketplace. These are mandated in Canada per CSA C22.2, No. 18, Clause 4.2.9.4. Several additional references to grounded nonmetallic boxes are in the NEC. 404.9(B) indicates the need for a grounded nonmetallic box. This revision would eliminate the potential for improper and inappropriate installations resulting in improper grounding.

Panel Meeting Action: Reject

Panel Statement:

See the panel statement on Proposal 9-71 (Log #3210).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

9-73 Log #1047 NEC-P09 **Final Action: Accept**
(314, Part IV)

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

This is a companion Proposal to add new Article 110 Part V and change Article 314 Title and 314.1.
Delete Article 314's Part IV "Manholes and Other Electric Enclosures Intended for Personnel Entry" in its entirety.

Substantiation:

The content of Part IV in Article 314 is more appropriate in Article 110 as the working clearance and safety requirements of electrical manholes and related fire resistivity will be contained with other relative information in Article 110 by this proposed change. Other specific reasons for this change are as follows:

- The provisions of current Part IV in Article 314 are conditional just like the requirements in Article 110, i.e.; the requirements are only applicable where the space "is likely to require examination, adjustment, servicing, or maintenance while energized."
- 314.52 addresses "cabling work space".
- 314.53 addresses "equipment work space".
- 314.54 only addresses bending space for conductors through requirements in Article 314, Part V and does make specific requirements in Part III.
- 314.55 addresses access to manholes.
- 314.56 addresses access to vaults and tunnels.
- 314.58 addresses guarding by referencing Article 110.

This is an action of the NEC TG on Usability based on NEC May 2001 ROC Comment 1-175 and NEC May 2001 ROP Proposal 9-51. For other related "user-friendly" substantiation, see NEC May 2001 ROC Comments 9-20 and 9-21.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

HARTWELL: The panel action should have been to reject. This is change for the sake of change. There was not a single proposal from the field in this cycle to make this relocation, nor was there a single proposal to change any technical requirements in this part. It is fine the way it is. The substantiation is without any technical merit whatsoever, and completely ignores why these rules are in the Code to begin with. Examples abound:

- Part IV requirements are NOT conditional like requirements in Article 110. With the sole exception of 314.53 (CMP 9 included this only for consistency), all of the requirements are prescriptive and apply to all such enclosures. Manholes are junction boxes large enough personnel to enter. They need to be sized accordingly. The technical requirements in Part IV generally address the issues of cable installation.
- The list of section titles is incomplete and misrepresents the function of some provisions. For example, 314.54 Exception modifies the normal rules for medium voltage conductors; the provisions of this part are not simply passed through from other parts. Ironically, the issue addressed in this exception is the very one that, when sent to the Code Forum department at EC&M Magazine, resulted in the controversy that this part of Article 314 was designed to, as a minimum, address. It is a bending space issue, and has nothing to do with the scope of Article 110.
- The motivating proposals and comments from the previous cycle addressed a rule for above-grade electrical vaults. The rule ended up in Article 110 as 110.30(A), as CMP 9 recommended. This rule has nothing to do with manholes.

All of that said, there is a case to be made in favor of moving some material to Article 110, although it certainly is not necessary. As a compromise, the proposal could be accepted in principle and in part. Relocate 314.56, 314.57, and 314.58 to Article 110. Delete the phrase "and Other Electric Enclosures" from the title of Part IV. Delete the word "vaults" from 314.51. Delete the phrase "vault, or other enclosure designed for personnel access" from 314.53.

This action would make a clear distinction between underground electrical rooms that belong in Article 110, and underground junction boxes large enough for personnel entry, which should stay in Article 314. As a veteran of a UTG task group, this CMP 9 member respects and supports efforts to enhance usability, but respectfully suggests that usability requires sensitivity to the motivations of Code users. As previously noted, Part IV entered the NEC because questions arose in the field about how to size a manhole containing very large medium voltage conductors. The overwhelming preponderance of manhole installations are simply large pull boxes that personnel can enter. Code users expect to find this information (and the technical expertise has been allocated accordingly) in Article 314. For completeness, and only to cover the few installations that actually contain this equipment, 314.53 can stay where it is. I suggest that a joint task group comprised of members from CMP 1 and 9 be set up to make further recommendations on this topic.

If Part IV is moved in its entirety, Article 110 will have increased in size by almost 75% in the short space of three code cycles. I suggest that it does not enhance usability to shoehorn large disparate parts of the NEC into a single article traditionally directed at personnel safety in the context of safe work about energized equipment. Furthermore, this Part IV of Article 314 would provide a convenient location to place relevant provisions for the mini-manholes now entering the Code in the form of handhole enclosures.

7-7 Log #2948 NEC-P07 **Final Action: Reject**
(320-6 (New))

Submitter: Martin J. Brett, Jr.

Recommendation:

Revise text as follows:
320.6 Listing Requirements. Type AC Cable and associated fittings shall be listed.

Substantiation:

As the supply chain becomes more global and the acceptance of the NEC grows internationally, it is important to clearly state the intent to require a listed product. Also, with the introduction of the common numbering system last cycle, xxx.6 was reserved for "Listing Requirements". Without an entry for 320.6 in this renumbered article, it could be assumed that these products do not need to be listed. The objective is to guarantee that Type AC cables installed in accordance with this article meet a minimum standard of performance for safety. The intent is that this product be evaluated and listed in accordance with the appropriate product standard.

Panel Meeting Action: Reject

Panel Statement:

There are several methods of approving products. One method should not be defined to the exclusion of the others.

Substantiation has not been provided to indicate that there is a problem with the current products. Standard products are listed, however, products designed for special applications or conditions may not fit the listing criteria. This change would limit the discretion of the Authority Having Jurisdiction to use means other than a listing to determine acceptability for special circumstances.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: The practice of requiring listing of products in the NEC is well established. Other Panels have added the "listed" requirement to the wiring methods for which they are responsible. Panel 7 should do the same. It was noted at the panel meeting that listing standards are not named in the NEC and that products might be listed to IEC or some other standard. Jurisdictions are familiar with listing standards expected to be used in conjunction with the NEC. Additionally if that is a true concern we could receive the same IEC product only UNLISTED.

If special application cables for engineer supervised installations are a concern of the panel, an exception for these circumstances can be made. At least the majority of cables would be listed. In all likelihood the Authority Having Jurisdiction would be involved in the approval of special application cable.

CANGEMI: The proposal should be accepted. Most of the cables used today are Listed. The panel statement indicates that a requirement for Listing would exclude all other methods for acceptance, and would limit the discretion of the Authority Having Jurisdiction to use means other than Listing to determine acceptability for special circumstances.

Listing is based on compliance with recognized product standards. Non-listed cables may not have been evaluated for compliance with such requirements, and in some cases lack of such compliance may make it difficult to determine acceptance in the field. For example, a non-listed cable may not function correctly with listed termination fittings. Methods of acceptance other than listing may not be available to the authority having jurisdiction. The authority having jurisdiction has always had the authority to exercise special judgment for special circumstances. A requirement for listing would not eliminate such authority.

SCHUMACHER: Even though it is required that products be listed in other parts of the code, this would make it perfectly clear that this product must be listed to meet the standards of this code.

STEWART: Listing adds an additional measure of testing to approve the products for its use by an independent agency. This provides the installer a method to identify standard products.

7-8 Log #2015 NEC-P07 **Final Action: Accept**
(320-10)

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the text in 320.10 as follows:

~~320.10 Uses Permitted.~~

~~Where not subject to physical damage, Type AC cable shall be permitted as follows:~~

~~(1) In both exposed and concealed work~~

~~(2) In cable trays where identified for such use~~

~~(3) In dry locations~~

~~(4) Embedded in plaster finish on brick or other masonry, except in damp or wet locations~~

~~(5) To be run or fished in the air voids of masonry block or tile walls where such walls are not exposed or subject to excessive moisture or dampness~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Not Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: The total elimination of "Uses Permitted" is not conducive to making the code user friendly. I have talked to many electricians in the field and most feel that this section gives them a quick overview on cable applications. The panel spent a great deal of time trying to ensure that oversights in the Task Group's original proposals were corrected. Although the panel was very deliberate other shortcomings may have been missed.

GOTHAM: I'm not in favor of removing uses permitted from the NEC. I believe this will be confusing to the electricians in the field and inspectors alike.

SCHUMACHER: The uses permitted is a quick reference to what the cable can be used for, and is totally separate from uses not permitted. While there may be certain areas where the task group can streamline the uses permitted to make it more economical, using a "shotgun" approach to this will only make the code more confusing to the people in the field.

STEWART: The intent was to make the NEC more "User Friendly". These proposals on deleting "Uses Permitted" and additions to "Uses Not Permitted" are very "USER UNFRIENDLY." There is nothing wrong with having both as in the previous codes. This tells the user and installer where they "can" and "cannot" use a specific wiring method. It is going to be very difficult to understand the presently proposed wording added in to "Uses Not Permitted" to be able to include the "Uses Permitted".

The "Uses Permitted" section of each article of the NEC as referenced by the aforementioned proposals provides guidance in accordance with the Code as follows:

Per the 2002 NEC, 110.8, Wiring Methods: "Only wiring methods recognized as suitable are included in this Code. The recognized methods of wiring shall be permitted to be installed in any type of building or occupancy, except as otherwise provided in this Code." Provisions and limitations are necessary for concise guidelines.

Per the 2002 NEC, 90.1(C), Intention: "This Code is not intended as a design specification or an instruction manual for untrained persons." The Code is there for trained individuals as a means of guidance as to the provisions and limitations for installations of materials and equipment to enable safe delivery and consumption of electricity. If the Code presents only the limitations without provisions, then the guidance is one-sided and will create additional confusion for the installer and designer based on assumptions.

The areas that are not identified or addressed within the Code are the responsibility of the "Authority Having Jurisdiction"; hence, "the organization, office, or individual responsible for approving equipment, materials, and installation, or a procedure" as defined in the 2002 NEC Chapter 1, Article 100. The installation should be in compliance with the parameters as set in the Code, and not subject to interpretation after the fact. This will only increase the gray areas that now will become subject to interpretation without proper Code representation.

The NEC April 1999 and 2003 Style Manual, Chapter 2, Document Structure and Numbering: presents an example of a typical format/structure for sections that includes the "Uses Permitted" and "Uses Not Permitted" phrases.

The 2002 NEC and prior editions have consistently presented both "Uses Permitted" and "Uses Not Permitted." These sections also included referenced sections of articles, exceptions, and fine print notes to provide additional clarification for the application and installation.

7-9 Log #3123 NEC-P07 **Final Action: Accept**
(320-10(2))

Submitter: Austin D. Wetherell, Underwriters Laboratories, Inc.

Recommendation:

Delete "where identified for such use".

Substantiation:

All AC cable is suitable for use in cable trays and no such identification is required.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-10 Log #955 NEC-P07 **Final Action: Reject**
(320-10(6))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add text to read as follows:
"(6) To be run or fished in dry walls, ceilings, floors, and crawlspaces."

Substantiation:

To clarify the permissibility of industry practices of long-standing acceptance that presently are not addressed in either 320-10 or 320-12.

Panel Meeting Action: Reject

Panel Statement:

320.30(B)(1) addresses the submitter's concern.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-11 Log #833 NEC-P07 **Final Action: Accept in Principle in Part**
(320-12)

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise:
In hazardous (classified) locations except where permitted in:
a. 501.4(B)(3) ~~Exception;~~
b. 502.4(B)(3) ~~Exception No. 1;~~
c. 504.20.
Add:
(8) Where containing conductors operating at over 600 volts, nominal.
(9) Where subject to physical damage.

Substantiation:

Previous Exceptions are now incorporated into text. Armored cable is not listed for over 600 volts. This is an important not permitted use, and is noted for some wiring methods, e.g. 356.12(4). Physical damage is noted for some wiring methods, e.g., 348.12 and 350.12. Some Type AC cables such as reduced wall and aluminum can be damaged by moderate force.

Panel Meeting Action: Accept in Principle in Part

In the recommendation, the panel accepts the deletions in 320.12(3) a. and b.
List item (9) in Proposal 7-11 is now list item (8) in Proposal 7-12.
The panel Rejects proposed (8).

Panel Statement:

320.104 stipulates that the conductors must be one of the types in Table 310.13 that only contains 600 V conductors. Proposal 7-8 deleted 320.10 and Proposal 7-12 included the material in 320.12(8).

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-12 Log #2017 NEC-P07 **Final Action: Accept**
(320-12)

TCC Action:

The Technical Correlating Committee understands that this proposal is further modified by the action taken on Proposal 7-13.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Revise the text in 320.12 as follows:
320.12 Uses Not Permitted.
Type AC cable shall not be used as follows:
(1) In theaters and similar locations, except where permitted in 518.4
(2) In motion picture studios
(3) In hazardous (classified) locations except where permitted in
a. 501.4(B), Exception
b. 502.4(B), Exception No. 1
c. 504.20
(4) Where exposed to corrosive fumes or vapors
(5) In storage battery rooms
(6) In hoistways, or on elevators or escalators, except where permitted in 620.21
(7) In commercial garages where prohibited in 511.4 and 511.7
(8) Where subject to physical damage.
(9) In damp or wet locations
(10) In air voids of masonry block or tile walls where such walls are exposed or subject to excessive moisture or dampness.
(11) Imbedded in plaster finish on brick or other masonry in damp or wet locations

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

BROWN: This should be rejected; the change isn't necessary if "Uses Permitted" remains in the code.
SCHUMACHER: This should be rejected, because getting rid of 320.10 should be rejected.
STEWART: See my Explanation of Negative for Proposal 7-8.

7-13 Log #2684 NEC-P07 **Final Action: Accept**
(320-12)

Submitter: Phil Simmons, Simmons Electrical Services / Rep. National Armored Cable Manufacturers Assn.

Recommendation:

Revise existing Section 320.12 as follows:
320.12 Uses Not Permitted.
Type AC cable shall not be used as follows:
~~(1) In theaters and similar locations, except where permitted in 518.4~~
~~(2) In motion picture studios~~
~~(3) In hazardous (classified) locations except where permitted in~~
~~a. 501.4(B), Exception~~
~~b. 502.4(B), Exception No. 1~~
~~c. 504.20~~
~~(4) Where exposed to corrosive fumes or vapors~~
~~(5) In storage battery rooms~~
~~(6) In hoistways, or on elevators or escalators, except where permitted in 620.21~~
~~(7) In commercial garages where prohibited in 511.4 and 511.7~~

Substantiation:

Section 90.3 gives the organization of the NEC and provides that Chapters 1 through 4 of the Code apply generally unless modified by Chapters 5, 6 or 7. It states in part, "These latter chapters supplement or modify the general rules. Chapters 1 through 4 apply except as amended by Chapters 5, 6, and 7 for the particular conditions." Due to this provision, several of the subsections of 320.12 should be deleted as they give the false impression that Type AC cable is prohibited in some occupancies while the opposite is true. In some cases, the later Articles of the NEC require specific constructions of Type AC cable such as having an insulated equipment grounding conductor but do not prohibit the installation of Type AC cable as is implied by this section.

Substantiation for deleting specific subsections include:

For deleting 320.12(1): Section 520.5 Wiring Methods governs and provides that Type AC cable is specifically permitted for wiring of theaters and similar locations if it contains an insulated equipment grounding conductor sized in accordance with Table 250.122. There is no reference in Article 520 to 518.4. Section 518.4 controls the wiring methods in Places of Assembly and permits Type AC cable if it contains an insulated equipment grounding conductor sized in accordance with Table 250.122. Section 320.12(1) gives the false impression that Type AC cable is not permitted in theaters and similar locations while, in fact, it is permitted under the conditions in 520.5.

For deleting 320.12(2): Section 530.11 Permanent Wiring, covers the wiring in motion picture studios. It provides "The permanent wiring shall be Type MC cable, Type AC cable containing an insulated equipment grounding conductor sized in accordance with Table 250.122, Type MI cable, or in approved raceways." As can be seen, Type AC cable is specifically permitted for wiring motion picture studios under the conditions of Section 530.11.

For deleting 320.12(3): the hazardous location articles specifically name the wiring methods permitted in the various Class, Division or Zone areas. As indicated in the present (3), Type AC cable is specifically permitted in or above some hazardous locations.

For deleting 320.12(5): Article 480 is (obviously) in Chapter 4 of the NEC and thus the general rules of the NEC apply. Section 480.9 Battery Locations. Requires in (A) that "Provisions shall be made for sufficient diffusion and ventilation of the gases from the battery to prevent the accumulation of an explosive mixture." As a result, battery locations are not hazardous locations or the Article would be located in Chapter 5 of the NEC. Article 480 does not contain any requirements for the general wiring of these rooms. As a result, Section 320.12(5) should be deleted.

For deleting 320.12(6): Section 620.21 Wiring Methods, covers the wiring methods for Elevators, Dumbwaiters, Escalators, Moving Walks, Wheelchair Lifts, and Stairway Chair Lifts very well and does not need any assistance from 320.12(6)! Section 620.21 specifically controls the use of Type AC cable for this equipment.

For deleting 320.12(7): the wiring of commercial garages is specifically covered in Article 511. This and other subsections of 320.12 seem more like Fine Print Notes pointing out where other sections may regulate wiring methods. Several of these Uses Not Permitted could be changed to positive statements and located in 320.10 such as "In commercial garages except where prohibited in 511.4 and 511.7." In reality, these cross-reference type requirements are not needed at all.

Panel Meeting Action: Accept

The action on this proposal deletes (1) thru (7) in Proposal 7-12.
Renumber (8) through (11) as (1) through (4).

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

STEWART: See my Explanation of Negative for Proposal 7-8.

7-14 Log #954 NEC-P07 **Final Action: Reject**
(320-12(8))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add text to read as follows:
"(8) Sleeved in a raceway for more than 3 m (10 ft)".

Substantiation:

To clarify that while it may be suitable to run cable in a short length of raceway for added physical protection, if protection is needed for more than a moderate distance it is safer, and thus more appropriate, to make a proper transition to a raceway wiring method.

Panel Meeting Action: Reject

Panel Statement:

Installation of Type AC cable in a raceway is not prohibited.

The submitter has not provided substantiation to indicate there are problems with the sleeving more than 10 feet. Additionally, the specific length of 10 feet has not been substantiated, and may be overly restrictive that would limit the discretion of the Authority Having Jurisdiction.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-15 Log #2117 NEC-P07 **Final Action: Accept**
(320-17)

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 3 for information.

Submitter: George W. Flach New Orleans, LA

Recommendation:

Revise as follows:
320.17 Through or Parallel to Framing Members. Type AC cable shall be protected in accordance with 300.4(A), (C), and (D) where installed parallel or through framing members.

Substantiation:

To make it clear which parts of 300.4 apply to the installation of Type AC cable. Some AHJs are requiring bushings for this cable where it is installed in holes in metal studs.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-16 Log #2499 NEC-P07 **Final Action: Accept in Principle**
(320-17)

Submitter: George W. Flach, Nat'l Armored Cable Mfrs' Assn. (NACMA)

Recommendation:

Revise 320.17 as follows:
320.17 Through or Parallel to Framing Members.
Type AC cable shall be protected in accordance with 300.4 as applicable where installed through or parallel to framing members.

Substantiation:

300.4(B)(1) contains specific protection requirements for Nonmetallic-Sheathed Cables and Electrical Nonmetallic Tubing through Metal Framing Members. The general reference to 300.4 in 320.17 is being misunderstood to mean that all of the requirements of 300.4 apply to AC cable, including those that specifically reference other wiring methods such as 300.4(B)(1). Adding the suggested text will clarify that requirements that are not applicable to AC cable do not apply.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action on Proposal 7-15.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-17 Log #2658 NEC-P07 **Final Action: Accept in Principle**
(320-17)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Revise existing Section 320.17 as follows:
320.17 Through or Parallel to Framing Members.
Type AC cable shall be protected in accordance with 300.4 where installed through or parallel to framing members.
Exception: The installation of Type AC cable shall not be required to comply with 300.4(B).

Substantiation:

Listed Type AC cable provides excellent protection from physical damage in compliance with the UL Product Safety Standard. It is suitable for installation in metal framing members without the bushings required for Type NM cable and electrical nonmetallic tubing.
While the title of 300.4(B) is "Nonmetallic-Sheathed Cables and Electrical Nonmetallic Tubing Through Metal Framing Members," some inspection authorities have interpreted Section 320.17 to require compliance with all of 300.4, even (B). This does not seem to be the intent of CMP-7 or of CMP-3.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action on Proposal 7-15.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-18 Log #1104 NEC-P07 **Final Action: Reject**
(320-30)

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence.
"All support straps, clips, hangers, and similar support hardware shall be identified for the purpose."

Substantiation:

Conduit straps, clips, and hangers may not be considered "fittings". According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

The current requirement is that the securing means be designed and installed so as to not damage the cable. Support and securing can be achieved in many ways and standard hardware items are generally acceptable. To require each of these items to be identified for each purpose, is overly restrictive. There is insufficient substantiation to support the change.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-19 Log #1718 NEC-P07 (320-30) **Final Action: Accept in Principle**

Submitter: Thomas E. Trainor, City of San Diego / Rep. IAEI

Recommendation:

Revise 320.30 to read as follows:

320.30 Securing and Supporting. Type AC cable shall be supported and secured by staples, cable ties, straps, hangers, or similar fittings, designed and installed so as not to damage the cable, at intervals not exceeding 1.4 m (4 1/2 ft) and within 300 mm (12 in.) of every outlet box, junction box, cabinet, or fitting.

(A) Horizontal Runs Through Holes and Notches. In other than vertical runs, cables installed in accordance with 300.4 shall be considered supported and secured where such support does not exceed 1.4 m (4 1/2ft) intervals and the armored cable is securely fastened in place by an approved means within 300 mm (12 in.) of each box, cabinet, conduit body or other armored cable termination.

(B) Unsupported Cables. Type AC cable shall be permitted to be unsupported where the cable:

(1) Is fished between access points~~, where~~ through concealed spaces in finished buildings or structures and supporting is impracticable; or

(2) Is not more than 600 mm (2 ft) in length at terminals where flexibility is necessary; or

(3) Is not more than 1.8 m (6 ft) in length from the last point of cable support ~~for~~ to the point of connections ~~within an accessible ceiling~~ to a luminaire~~(s) ([~~lighting fixture~~(s)]~~) or other piece of electrical equipment and the cable and point of connection are within an accessible ceiling.

(C) Cable Trays. Type AC Cable installed in cable trays shall comply with 392.8(B).

If the proposed revisions are accepted, the section will read as follows:

320.30 Securing and Supporting. Type AC cable shall be supported and secured by staples, cable ties, straps, hangers, or similar fittings, designed and installed so as not to damage the cable, at intervals not exceeding 1 .4 m (4 1/2 ft) and within 300 mm (12 in.) of every outlet box, junction box, cabinet, or fitting.

(A) Horizontal Runs Through Holes and Notches. In other than vertical runs, cables installed in accordance with 300.4 shall be considered supported and secured where such support does not exceed 1.4 m (4 1/2 ft) intervals and the armored cable is securely fastened in place by an approved means within 300 mm (12 in.) of each box, cabinet, conduit body or other armored cable termination.

(B) Unsupported Cables. Type AC cable shall be permitted to be unsupported where the cable:

(1) Is fished between access points through concealed spaces in finished buildings or structures and supporting is impracticable; or

(2) Is not more than 600 mm (2 ft) in length at terminals where flexibility is necessary; or

(3) Is not more than 1.8 m (6 ft) in length from the last point of cable support to the point of connection to a luminaire (lighting fixture) or other piece of electrical equipment and the cable and point of connection are within an accessible ceiling.

(C) Cable Trays. Type AC Cable installed in cable trays shall comply with 392.8(B).

Substantiation:

Editorial changes which, with companion proposals, are intended to provide consistent wording for the securing and supporting requirements in 334, 320, 330 and 332.

Panel Meeting Action: Accept in Principle

The panel understands that the "s" in the word "points" (B)(1) should not be struck through.

In the recommended wording for (B)(3) revise, the last sentence to read as follows:

"For the purposes of this section, Type AC cable fittings shall be permitted as a means of cable support."

Delete item (C).

Panel Statement:

392.8(B) already applies. The remainder of the changes add clarity.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-20 Log #2685 NEC-P07 **Final Action: Reject**
(320-30)

Submitter: Phil Simmons, Simmons Electrical Services / Rep. National Armored Cable Manufacturers Assn.

Recommendation:

Revise existing Section 320.30 as follows:

320.30 Securing and Supporting.

(A) General. Type AC cable shall be secured and supported by connectors, staples, cable ties, straps, hangers, or similar fittings designed and installed so as not to damage the cable ~~at intervals not exceeding 1.4 m (4 1/2 ft) and within 300 mm (12 in.) of every outlet box, junction box, cabinet, or fitting.~~

(B) Securing. Unless otherwise provided, Type AC cable shall be secured within 300 mm (12 in.) of every outlet box, junction box, cabinet, or fitting and at intervals not exceeding 1.8 m (6 ft) where installed on or across the surface of framing members.

(C) Supporting. Cable shall be supported at intervals not exceeding 1.8 m (6 ft).

(1) ~~(A)~~ **Horizontal Runs Through Holes and Notches.** ~~In other than vertical runs,~~ Cables installed in wooden or metal framing members ~~accordance with 300.4~~ shall be considered supported ~~and secured~~ where such support does not exceed 1.8 m (6 ft) ~~1.4 m (4 1/2 ft)~~ intervals ~~and the armored cable is securely fastened in place by an approved means within 300 mm (12 in.) of each box, cabinet, conduit body, or other armored cable termination.~~

(D) ~~(B)~~ **Unsupported Cables.** Type AC cable shall be permitted to be unsupported where the cable:

(1) Is fished between access points, where concealed in finished buildings or structures and supporting is impracticable; or

(2) Is not more than 600 mm (2 ft) in length at terminals where flexibility is necessary; or

(3) Is not more than 1.8 m (6 ft) from the last point of support for connections within an accessible ceiling to luminaire(s) [lighting fixture(s)] or equipment.

(E) ~~(C)~~ **Cable Trays.** Type AC cable installed in cable trays shall comply with 392.8(B).

Substantiation:

This proposal intends to correlate the requirements for supporting Type AC cable with that for identical sizes of Type MC cable in 330.30. It also intends to clarify the requirements for securing and supporting Type AC cable.

The word "connector" is proposed for the opening sentence as cable connectors both secure the cable to an enclosure such as a box or luminaire (lighting fixture) as well as support the cable.

The new subsection (A) General is proposed to give a title to the opening paragraph and include requirements here that apply generally to all cable installations including securing and supporting the cable.

The substantiation for moving the text regarding securing the cable within 300 mm (12 in.) of each box, cabinet, conduit body, or other armored cable termination to the new (B) Securing, is this rule should apply to both vertical as well as horizontal cable installations.

Type AC cable is very similar to Type MC cable in construction and provides a very robust wiring method. The support requirements should be the same as for Type MC cable rather than Type NM cable. There is no technically sound reason that the existing requirements for supporting Type AC cable should be the same as for Type NM cables as it compares favorably in construction to Type MC cable.

The language regarding cables being installed in accordance with 300.4 seems inappropriate as the issue here is whether the wooden or metal framing members adequately support the cable, not whether the cable complies with the protection requirements of 300.4. Protection of Type AC cable installed in or on framing members is adequately covered in 320.17 and 320.23.

Other changes are intended to be editorial.

Panel Meeting Action: Reject

Panel Statement:

No technical substantiation was provided to justify the change in distance for securing and supporting.

The addition of the word "connector" would eliminate the requirement to secure and support the cable within 12 inches of an outlet box or termination.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-21 Log #2411 NEC-P07 **Final Action: Reject**
(320-30(B)(3))

Submitter: Wayne Sargent, City of Salem, Oregon

Recommendation:

(B) Unsupported Cables. Type AC cable shall be permitted to be unsupported where the cable:
(3) Does not rest on the ceiling grid as prohibited by 300.11(A) and is not more than 1.8 m (6 ft) from the last point of support for connections within an accessible ceiling to luminaire(s) [(lighting fixture(s)] or equipment.

Substantiation:

The problem is an apparent conflict between the intent of 300.11(A) to keep cables and raceways off of the ceiling grid system, and the three wiring methods [AC, MC and NM cable] permitted to be unsupported in short lengths. With recent changes to Chapter 8, it appears to be the intent of the NEC to clean up the area above suspended ceilings. These short unsupported "whips" above grids are often installed in standard 1.8 m [6 foot] lengths. Most electricians tie these up in some way; however, many times they are left laying on the grid. If it is only 2 feet from the j-box to the luminaire, there can be 4 feet of cable resting on the ceiling grid if they interpret the permission to be unsupported that is granted by the applicable wiring method section [320.30(B)(3), 330.30(B)(2), and 334.30(B)(2)], as permission to ignore 300.11(A).

Panel Meeting Action: Reject

Panel Statement:

This requirement is already in place in 300.11(A).

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-22 Log #2686 NEC-P07 **Final Action: Accept**
(320-80(A))

Submitter: Phil Simmons, Simmons Electrical Services / Rep. National Armored Cable Manufacturers Assn.

Recommendation:

Revise existing Section 320.80(A) as follows:
(A) Thermal Insulation. Armored cable installed in thermal insulation shall have conductors rated at 90°C (194°F). The ampacity of cable installed in these applications shall be that of 60°C (140°F) conductors. The 90°C (194°F) rating shall be permitted to be used for ampacity derating purposes, provided the final derated ampacity does not exceed that for a 60°C (140°F) rated conductor.

Substantiation:

The added sentence brings this section into harmony with 334.80 on ampacity derating of Type NM cable. The sentence will clarify that the 90 degree C ampacity of the conductors can be used for derating purposes.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Sequence Number 7-23 is not used.

7-24 Log #2947 NEC-P07 **Final Action: Reject**
(322-6 (New))

Submitter: Martin J. Brett, Jr.

Recommendation:

Revise text as follows:
322.6 Listing Requirements. Type FC cable assemblies and associated fittings shall be listed.

Substantiation:

As the supply chain becomes more global and the acceptance of the NEC grows internationally, it is important to clearly state the intent to require a listed product. Also, with the introduction of the common numbering system last cycle, xxx.6 was reserved for "Listing Requirements". Without an entry for 322.6 in this renumbered article, it could be assumed that these products do not need to be listed. The objective is to guarantee that Type FC cables installed in accordance with this article meet a minimum standard of performance for safety. The intent is that this product be evaluated and listed in accordance with the appropriate product standard.

Panel Meeting Action: Reject

Panel Statement:

There are several methods of approving products. One method should not be defined to the exclusion of the others.

Substantiation has not been provided to indicate that there is a problem with the current products. Standard products are listed, however, products designed for special applications or conditions may not fit the listing criteria. This change would limit the discretion of the Authority Having Jurisdiction to use means other than a listing to determine acceptability for special circumstances.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-7.
CANGEMI: See my Explanation of Negative on Proposal 7-7.
SCHUMACHER: Even though it is required that products be listed in other parts of the code, this would make it perfectly clear that this product must be listed to meet the standards of this code.
STEWART: See my Explanation of Negative for Proposal 7-7.

7-25 Log #2014 NEC-P07 **Final Action: Accept**
(322-10)

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the text in 322.10 as follows:
~~322.10 Uses Permitted.~~
~~Flat cable assemblies shall be permitted only as follows:~~
~~(1) As branch circuits to supply suitable tap devices for lighting, small appliances, or small power loads. The rating of the branch circuit shall not exceed 30 amperes.~~
~~(2) Where installed for exposed work.~~
~~(3) In locations where they will not be subjected to physical damage. Where a flat cable assembly is installed less than 2.5 m (8 ft) above the floor or fixed working platform, it shall be protected by a cover identified for the use.~~
~~(4) In surface metal raceways identified for the use. The channel portion of the surface metal raceway systems shall be installed as complete systems before the flat cable assemblies are pulled into the raceways.~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Not Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-8.
GOTHAM: See my Explanation of Negative on Proposal 7-8.
SCHUMACHER: The uses permitted is a quick reference to what the cable can be used for, and is totally separate from uses not permitted. While there may be certain areas where the task group can streamline the uses permitted to make it more economical, using a "shotgun" approach to this will only make the code more confusing to the people in the field.
STEWART: See my Explanation of Negative for Proposal 7-8.

7-26 Log #258 NEC-P07 **Final Action: Accept**
(322-12)

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the sentence.

Substantiation:

This change will permit each of the following 4 list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Accept

Panel Statement:

The panel understands that acceptance of this proposal will modify Proposal 7-27.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-27 Log #2016 NEC-P07 **Final Action: Accept**
(322-12)

TCC Action:

The Technical Correlating Committee understands that this proposal is further modified by the action taken on Proposal 7-26.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Revise the text in 322.12 as follows:
322.12 Uses Not Permitted.
Flat cable assemblies shall not be used as follows:
(1) Where subject to corrosive vapors unless suitable for the application
(2) In hoistways or on elevators or escalators
(3) In any hazardous (classified) location
(4) Outdoors or in wet or damp locations unless identified for the use
(5) Where subject to physical damage
(6) Where installed less than 2.5 m (8 ft) above the floor or fixed working platform, unless protected by a cover identified for the use
(7) Where installed in concealed locations
(8) Where the rating of the branch circuit exceeds 30 amperes
(9) As a branch circuit other than to supply tap devices for lighting, small appliances, or small power loads
(10) In surface metal raceways, unless identified for that use and, if the channel portion of the surface metal raceway systems are installed as a complete system before the flat cable assemblies are pulled into the raceways

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-12.
SCHUMACHER: This should be rejected, because getting rid of 322.10 should be rejected.
STEWART: See my Explanation of Negative for Proposal 7-8.

7-28 Log #2205 NEC-P07 **Final Action: Reject**
(322-56)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
322.56 Splices and Taps.
(A) Splices. Splices shall be made in listed junction boxes.
(B) Taps. Taps shall be made between any phase conductor and the ~~grounded~~ earth conductor or any other phase conductor by means of devices and fittings identified for the use. Tap devices shall be rated at not less than 15 amperes, or more than 300 volts to ground, and they shall be color coded in accordance with the requirements of 322.120(C).

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.

I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.

The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.

I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The term "grounded" has been universally accepted within the NEC for many years, and changing to "earthing" will not enhance the clarity of the code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

SCHUMACHER: I agree with the panel in rejecting this proposal, the term "earthing" is not an excepted term in this country. "Grounding" is the term that is defined in Article 100, and in Article 250.

7-29 Log #2204 NEC-P07 (322-120) **Final Action: Reject**

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:

322.120 Marking.

(A) Temperature Rating. In addition to the provisions of 310.11, Type FC cable shall have the temperature rating durably marked on the surface at intervals not exceeding 600 mm (24 in.).

(B) Identification of ~~Grounded~~ Earth Conductor. The ~~grounded~~ earth conductor shall be identified throughout its length by means of a distinctive and durable white or gray marking.

FPN: The color gray may have been used in the past as an ungrounded conductor. Care should be taken when working on existing systems.

(C) Terminal Block Identification. Terminal blocks identified for the use shall have distinctive and durable markings for color or word coding. The ~~grounded earth~~ conductor section shall have a white marking or other suitable designation. The next adjacent section of the terminal block shall have a black marking or other suitable designation. The next section shall have a red marking or other suitable designation. The final or outer section, opposite the ~~grounded~~ earth conductor section of the terminal block, shall have a blue marking or other suitable designation.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.

I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.

The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.

I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The term "grounded" has been universally accepted within the NEC for many years, and changing to "earthing" will not enhance the clarity of the Code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-30 Log #1713 NEC-P07 (324) **Final Action: Reject**

TCC Action:

The Technical Correlating Committee directs that this proposal be forwarded to Code-Making Panel 10 for comment on the overcurrent protection requirements in this proposal.

Submitter: Robert J. Sexton, De Corp Americas Inc.

Recommendation:

[Text of Proposal 7-30 recommendation is shown on page 2312]

Substantiation:

[Text of Proposal 7-30 substantiation is shown on page 2314]

Panel Meeting Action: Reject

Panel Statement:

In accordance with 324.1, Type FCC cable is specifically designed for installation under carpet squares. It is not intended for exposed installation on walls or ceilings.

The submitter should provide a Fact-Finding Report from an independent testing labratory to validate performance and operation in support of the proposed changes.

The panel would also like to point out that Code-Making Panel 10 would be required to review the circuit protection features, as protection falls under their purview.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-31 Log #2208 NEC-P07 **Final Action: Reject**
(324-2–Definitions)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
324.2 Definitions.
Bottom Shield. A protective layer that is installed between the floor and Type FCC flat conductor cable to protect the cable from physical damage and may or may not be incorporated as an integral part of the cable.
Cable Connector. A connector designed to join Type FCC cables without using a junction box.
FCC System. A complete wiring system for branch circuits that is designed for installation under carpet squares. The FCC system includes Type FCC cable and associated shielding, connectors, terminators, adapters, boxes, and receptacles.
Insulating End. An insulator designed to electrically insulate the end of a Type FCC cable.
Metal Shield Connections. Means of connection designed to electrically and mechanically connect a metal shield to another metal shield, to a receptacle housing or self-contained device, or to a transition assembly.
Top Shield. An ~~grounded~~ earthed metal shield covering under-carpet components of the FCC system for the purposes of providing protection against physical damage.
Transition Assembly. An assembly to facilitate connection of the FCC system to other wiring systems, incorporating (1) a means of electrical interconnection and (2) a suitable box or covering for providing electrical safety and protection against physical damage.
Type FCC Cable. Three or more flat copper conductors placed edge-to-edge and separated and enclosed within an insulating assembly.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The term "grounded" has been universally accepted within the NEC for many years, and changing to "earthing" will not enhance the clarity of the Code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-32 Log #2946 NEC-P07 **Final Action: Accept**
(324-6)

Submitter: Martin J. Brett, Jr.

Recommendation:

Revise text as follows:
324.6 Listing Requirements. Type FCC Cable and associated fittings shall be listed.

Substantiation:

As the supply chain becomes more global and the acceptance of the NEC grows internationally, it is important to clearly state the intent to require a listed product. Also, with the introduction of the common numbering system last cycle, xxx.6 was reserved for "Listing Requirements". Without an entry for 324.6 in this renumbered article, it could be assumed that these products do not need to be listed. The objective is to guarantee that Type FCC cables installed in accordance with this article meet a minimum standard of performance for safety. The intent is that this product be evaluated and listed in accordance with the appropriate product standard.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

DALY: There are several methods of approving products. One method should not be defined to the exclusion of the others. Substantiation has not been provided to indicate that there is a problem with the current products. Standard products are listed, however, products designed for special applications or conditions may not fit the listing criteria. This change would limit the discretion of the Authority Having Jurisdiction to use means other than a listing to determine acceptability for special circumstances.

STRANIERO: The panel acted to reject all proposals to require that cables be listed except for Type FCC. The proposal to require that Type FCC be listed should be rejected for the same reasons.

There are several methods of approving products. One method should not be defined to the exclusion of the others. Substantiation has not been provided to indicate that there is a problem with the current products. Standard products are listed, however, products designed for special applications or conditions may not fit the listing criteria. This change would limit the discretion of the Authority Having Jurisdiction to use means other than a listing to determine acceptability for special circumstances.

Comment on Affirmative:

SCHUMACHER: Listing products in the individual articles removes all doubt that the intent of the code is to have products listed, and that all associated parts also be listed.

7-33 Log #2206 NEC-P07 **Final Action: Reject**
(324-10(B)(1))

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
324.10 Uses Permitted.
(A) Branch Circuits. Use of FCC systems shall be permitted both for general-purpose and appliance branch circuits and for individual branch circuits.
(B) Branch-Circuit Ratings.
(1) Voltage. Voltage between ungrounded conductors shall not exceed 300 volts. Voltage between ungrounded conductors and the ~~grounded~~ earth conductor shall not exceed 150 volts.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.

I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.

The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.

I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The term "grounded" has been universally accepted within the NEC for many years, and changing to "earthing" will not enhance the clarity of the code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-34 Log #2050 NEC-P07 (324-12) **Final Action: Accept in Principle in Part**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Remove text from 324.10 and reword text to fit within 324.12 under uses not permitted as follows:

324.12 Uses Not Permitted.

FCC systems shall not be used:

(1) Outdoors or in wet locations

(2) Where subject to corrosive vapors

(3) In any hazardous (classified) location

(4) In residential, school, and hospital buildings

(5) Where voltage between ungrounded conductors exceeds 300 volts or the voltage between ungrounded conductors and the grounded conductor exceeds 150 volts.

(6) Where general-purpose and appliance branch circuits have ratings exceeding 20 amperes or individual branch circuits have ratings exceeding 30 amperes.

(7) On floors, unless installed on hard, sound, smooth, continuous surfaces made of concrete, ceramic, or composition flooring, wood, or similar materials.

(8) On wall surfaces, unless enclosed in surface metal raceways

(9) On heated floors heated in excess of 30°C (86°F), unless the materials used for floors are identified as suitable for use at these temperatures.

(10) Where any portion of an FCC system with a height above floor level exceeds 2.3 mm (0.090 in.), unless tapered or feathered at the edges to floor level.

Substantiation:

324.10(H) has been relocated to new Section 324.41, 324.10(J) has been relocated to new Section 324.40(E), and 324.10(I) has been relocated to new Section 324.101. The remainder of 324.10 has been rewritten into 324.12, Uses Not Permitted.

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept in Principle in Part

The panel accepts the deletion of 324.10 and the additional text in 324.12 of (5) through (8) and (10).

Revise (9) to read as follows: "On heated floors heated in excess of 30°C (86°F), unless the the FCC system is identified as suitable for use at that temperature."

Panel Statement:

List item (9) was revised for clarity to indicate that the cable must be suitable at these temperatures, not the floor materials.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

SCHUMACHER: In this article the uses permitted is very specific, and the uses not permitted as presently written just serves to clarify the intent of the code in relation to this cable.

7-35 Log #2207 NEC-P07 **Final Action: Reject**
(324-18)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
324.18 Crossings. Crossings of more than two Type FCC cable runs shall not be permitted at any one point. Crossings of a Type FCC cable over or under a flat communications or signal or signal cable shall be permitted. In each case, an ~~grounded~~ earthed layer of metal shielding shall separate the two cables, and crossings of more than two flat cables shall not be permitted at any one point.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The term "grounded" has been universally accepted within the NEC for many years, and changing to "earthing" will not enhance the clarity of the Code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-36 Log #2405 NEC-P07 **Final Action: Reject**
(324-23(E))

Submitter: Bryan Coak, Springs & Sons Electric

Recommendation:

After "two or more conduits threaded wrenchtight into the enclosure or hubs." insert A threadless connector approved for the purpose, may be used to connect one of the required conduits into the enclosure or hub.

Substantiation:

When running rigid metal or intermediate metal conduit underground between several boxes such as for receptacles in the back yard of a residential occupancy, a threadless connector would be plenty adequate to support the box when the two conduits are turned up and one conduit threaded into the box and the other fastened with a threadless fitting. It is impossible to thread two conduits into a box when they are coming out of a trench and 90'd up.

Panel Meeting Action: Reject

Panel Statement:

There is no 324.23. The proposal appears to refer to RMC and IMC.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-37 Log #2053 NEC-P07 **Final Action: Accept**
(324-40(E))

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Remove information from Section 324.10(J) and relocate it to Section 324.40(E) to read as follows:
(E) Metal-Shield Connectors. Metal shields shall be connected to each other and to boxes, receptacle housings, self-contained devices, and transition assemblies using metal-shield connectors.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This is a companion proposal to revise 324.12 to include the Uses Permitted Language.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
GOTHAM: See my Explanation of Negative on Proposal 7-8.

7-38 Log #2055 NEC-P07 (324-41) **Final Action: Accept**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Move Section 324.10(H) to a new Section 324.41 Floor Coverings to read as follows:

324.41 Floor Coverings. Floor-mounted Type FCC cable, cable connectors, and insulating ends shall be covered with carpet squares not larger than 914 mm (36 in.) square. Those carpet squares that are adhered to the floor shall be attached with release-type adhesives.

Substantiation:

This Section should not be located under uses permitted but rather should be a section by itself much the same as Boxes and Fittings and Devices. By inserting it into its own section, the text will be much easier to use and more identifiable.

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This is a companion proposal to revise 324.12 to include the Uses Permitted Language.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

GOTHAM: See my Explanation of Negative on Proposal 7-8.

7-39 Log #2209 NEC-P07 **Final Action: Reject**
(324-56)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
324.56 Splices and Taps.
(A) FCC Systems Alterations. Alterations to FCC systems shall be permitted. New cable connectors shall be used at new connection points to make alterations. It shall be permitted to leave unused cable runs and associated cable connectors in place and energized. All cable ends shall be covered with insulating ends.
(B) Transition Assemblies. All transition assemblies shall be identified for their use. Each assembly shall incorporate means for facilitating entry of the Type FCC cable into the assembly, for connecting the Type FCC cable to ~~grounded~~ earth conductors, and for electrically connecting the assembly to the metal cable shields and to equipment grounding conductors.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The term "grounded" has been universally accepted within the NEC for many years, and changing to "earthing" will not enhance the clarity of the Code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-40 Log #1887 NEC-P07 **Final Action: Reject**
(324-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
324.60 Grounding. All metal shields, boxes, receptacle housings, and self-contained devices shall be electrically continuous to the equipment ~~grounding~~ bonding conductor of the supplying branch circuit. All such electrical connections shall be made with connectors identified for this use. The electrical resistivity of such shield system shall not be more than that of one conductor of the Type FCC cable used in the installation.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

The Panel agrees that there is confusion in the field surrounding these two terms and supports the concept of this change. However, the decision to use the terms "grounding" or "bonding" is the responsibility of Code-Making Panel 5. Code-Making Panel 7 requests that the Technical Correlating Committee appoint a Task Group to study the impact of such a change. Code-Making Panel 7 requests the opportunity to review any changes of these terms that are under their purview.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

STRANIERO: See my Comment on Affirmative on Proposal 7-1.

7-41 Log #1886 NEC-P07 (324-100) **Final Action: Reject**

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
324.100 Construction.
(A) Type FCC Cable. Type FCC cable shall be listed for use with the FCC system and shall consist of three, four, or five flat copper conductors, one of which shall be an equipment ~~grounding~~ bonding conductor.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

The Panel agrees that there is confusion in the field surrounding these two terms and supports the concept of this change. However, the decision to use the terms "grounding" or "bonding" is the responsibility of Code-Making Panel 5. Code-Making Panel 7 requests that the Technical Correlating Committee appoint a Task Group to study the impact of such a change. Code-Making Panel 7 requests the opportunity to review any changes of these terms that are under their purview.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

STRANIERO: See my Comment on Affirmative on Proposal 7-1.

7-42 Log #2057 NEC-P07 (324-101) **Final Action: Accept**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Remove the text from 324.10(I) and move it to new Section 324.101 as follows:

324.101. Corrosion Resistance. Metal components of the system shall be either corrosion resistant, coated with corrosion-resistant materials, or insulated from contact with corrosive substances.

Substantiation:

This information is more appropriate for Part III of this article since it is part of the construction of the wiring method than where it was in 324.10 under uses permitted.

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This is a companion proposal to revise 324.12 to include the Uses Permitted Language.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

GOTHAM: See my Explanation of Negative on Proposal 7-8.

7-43 Log #2945 NEC-P07 **Final Action: Reject**
(326-6 (New))

Submitter: Martin J. Brett, Jr.

Recommendation:

Revise text as follows:
326.6 Listing Requirements. Type IGS Cable and associated fittings shall be listed.

Substantiation:

As the supply chain becomes more global and the acceptance of the NEC grows internationally, it is important to clearly state the intent to require a listed product. Also, with the introduction of the common numbering system last cycle, xxx.6 was reserved for "Listing Requirements". Without an entry for 326.6 in this renumbered article, it could be assumed that these products do not need to be listed. The objective is to guarantee that Type IGS cables installed in accordance with this article meet a minimum standard of performance for safety. The intent is that this product be evaluated and listed in accordance with the appropriate product standard.

Panel Meeting Action: Reject

Panel Statement:

Type IGS cable has very limited applications. It is only used under engineering supervision. No product standard exists since there is only one manufacturer.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-7.
CANGEMI: See my Explanation of Negative on Proposal 7-7.
STEWART: See my Explanation of Negative for Proposal 7-7.

7-44 Log #2054 NEC-P07 **Final Action: Accept**
(326-10)

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the text in Section 326.10 as follows:
326.10 Uses Permitted.
Type IGS cable shall be permitted for use under ground, including direct burial in the earth, as the following:
(1) Service-entrance conductors
(2) Feeder or branch-circuit conductors

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This is a companion proposal to revise 326.12 to include the Uses Permitted Language.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-8.
GOTHAM: See my Explanation of Negative on Proposal 7-8.
SCHUMACHER: This article is a good example of where we need 326.10, because the uses are very specific, as they are the uses not permitted. With the limited use of this cable, a uses permitted area in the code only makes it more clear as to how this cable is used.
STEWART: See my Explanation of Negative for Proposal 7-8.

7-45 Log #2051 NEC-P07 (326-12) **Final Action: Accept**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Remove the text from Section 326.10 and reword it into 326.12 as follows:
326.12 Uses Not Permitted.
Type IGS cable shall not be
(1) Used as interior wiring
(2) Exposed in contact with buildings.
(3) Used above ground

Substantiation:

Section 326.10 gave permission to use this wiring method for service entrance conductors, feeder conductors, and branch circuit conductors in below ground applications and as direct burial. By placing the text in uses not permitted above ground, it would provide the necessary requirements and be consistent with the other changes to Chapter 3 wiring methods.

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-12.

GOTHAM: See my Explanation of Negative on Proposal 7-8.

SCHUMACHER: This should be rejected, see my Explanation of Negative Vote on Proposal 7-44.

7-46 Log #2049 NEC-P07 (328-1) **Final Action: Reject**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Add the rating of power systems up to 35,000 volts, nominal to the scope of Article 328 as follows:

328.1 Scope.

This article covers the use, installation, and construction specifications for medium voltage cable, Type MV for use on power systems rated up to 35,000 volts, nominal.

Substantiation:

If Section 328.10 is deleted by a companion proposal, the information for the maximum voltage rating of the system must be added to the scope of this article to provide the voltage limitations of the power systems where MV cable can be installed.

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This is a companion proposal to revise 328.12 to include the Uses Permitted Language.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

69 kV is utilized by industrial and commercial facilities as medium voltage. 328.2 specifies medium voltage as "2001 volts or higher." ANSI has an undefined class from 0 to 34,500 V and "higher voltage systems" up to 230 kV. IEEE Standard 100, IEEE Standard Dictionary of Electrical and Electronics Terms, defines medium voltage from 2400 V to 69 kV.

Since OSHA utilizes the Code for enforcement, the 35,000 V limit should not be specified until another voltage class up to 69 kV or 138 kV is included in the Code.

Article scopes are the responsibility of the Technical Correlating Committee.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

BROWN: The present code limits the use of NV cable up to 35,000 volts. No technical substantiation was submitted to change these requirements.

SCHUMACHER: The present code limits the use of this cable up to 35,000 Volts, and no technical substantiation was submitted to change this requirement.

7-47 Log #2944 NEC-P07 **Final Action: Reject**
(328-6 (New))

Submitter: Martin J. Brett, Jr.

Recommendation:

Revise text as follows:
328.6 Listing Requirements. Type MV Cable and associated fittings shall be listed.

Substantiation:

As the supply chain becomes more global and the acceptance of the NEC grows internationally, it is important to clearly state the intent to require a listed product. Also, with the introduction of the common numbering system last cycle, xxx.6 was reserved for "Listing Requirements". Without an entry for 328.6 in this renumbered article, it could be assumed that these products do not need to be listed. The objective is to guarantee that Types MV cables installed in accordance with this article meet a minimum standard of performance for safety. The intent is that this product be evaluated and listed in accordance with the appropriate product standard.

Panel Meeting Action: Reject

Panel Statement:

There are several methods of approving products. One method should not be defined to the exclusion of the others.

Substantiation has not been provided to indicate that there is a problem with the current products. Standard products are listed, however, products designed for special applications or conditions may not fit the listing criteria. This change would limit the discretion of the Authority Having Jurisdiction to use means other than a listing to determine acceptability for special circumstances.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-7.

CANGEMI: See my Explanation of Negative on Proposal 7-7.

SCHUMACHER: Even though it is required that products be listed in other parts of the code, this would make it perfectly clear that this product must be listed to meet the standards of this code.

STEWART: See my Explanation of Negative for Proposal 7-7.

7-48 Log #259 NEC-P07 **Final Action: Accept**
(328-10)

Submitter: James M. Daly, General Cable

Recommendation:

Change the third line from "nominal, as follows:" to "nominal:"

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-49 Log #2056 NEC-P07 **Final Action: Accept**
(328-10)

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the text from 328.10 as follows:

328.10 Uses Permitted.

Type MV cables shall be permitted for use on power systems rated up to 35,000 volts, nominal, as follows:

(1) In wet or dry locations
(2) In raceways
(3) In cable trays as specified in 392.3(B)(1)
(4) Direct buried in accordance with 300.50
(5) In messenger-supported wiring

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This is a companion proposal to revise 328.12 to include the Uses Permitted Language.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-8.

GOTHAM: See my Explanation of Negative on Proposal 7-8.

SCHUMACHER: The uses permitted should be kept as part of the code, as they provide a quick reference as to how this cable can be used. Also, deleting this gets rid of the voltage rating for MV cable, with no technical substantiation.

STEWART: See my Explanation of Negative for Proposal 7-8.

7-50 Log #920 NEC-P07 **Final Action: Accept in Principle**
(328-10(3))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(3) In cable trays as specified in 392.3(B)(2)~~(1)~~.

Substantiation:

392.3(B)(2) addresses medium voltage.

Panel Meeting Action: Accept in Principle

Panel Statement:

The panel understands that the action on this proposal will modify the action taken on Proposal 7-52 in 328.12(2).

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-51 Log #260 NEC-P07 **Final Action: Accept**
(328-12)

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Accept

Panel Statement:

The panel understands that the action on this proposal will modify the text of Proposal 7-52 in 328.12.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-52 Log #2052 NEC-P07 **Final Action: Accept in Principle**
(328-12)

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

328.12 Uses Not Permitted.

Unless identified for the use, Type MV cable shall not be used as follows:

(1) Where exposed to direct sunlight

(2) In cable trays, unless specified in 392.3(B)(1)

(3) Direct buried, unless in accordance with 300.50

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept in Principle

In the recommended text, in (2), change "392.3(B)(1)" to "392.3(B)(2)."

Panel Statement:

Editorial change to provide the correct reference.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-12.

SCHUMACHER: This should be rejected, because getting rid of 328.10 should be rejected.

STEWART: See my Explanation of Negative for Proposal 7-8.

7-53 Log #941 NEC-P07 **Final Action: Accept**
(328-100)

Submitter: James M. Daly, General Cable

Recommendation:

Revise 328.100 as follows:
Type MV cables shall have copper, aluminum, or copper-clad aluminum conductors and shall comply with Table 310.61 and Tables 310.63 or 310.64 ~~be constructed in accordance with Article 310~~.

Substantiation:

4.1.1 of the 2001 NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-54 Log #2943 NEC-P07 **Final Action: Reject**
(330-6 (New))

Submitter: Martin J. Brett, Jr.

Recommendation:

Revise text as follows:
330.6 Listing Requirements. Type MC cable and associated fittings shall be listed.

Substantiation:

As the supply chain becomes more global and the acceptance of the NEC grows internationally, it is important to clearly state the intent to require a listed product. Also, with the introduction of the common numbering system last cycle, xxx.6 was reserved for "Listing Requirements". Without an entry for 330.6 in this renumbered article, it could be assumed that these products do not need to be listed. The objective is to guarantee that Type MC cables installed in accordance with this article meet a minimum standard of performance for safety. The intent is that this product be evaluated and listed in accordance with the appropriate product standard.

Panel Meeting Action: Reject

Panel Statement:

There are several methods of approving products. One method should not be defined to the exclusion of the others.
Substantiation has not been provided to indicate that there is a problem with the current products. Standard products are listed, however, products designed for special applications or conditions may not fit the listing criteria. This change would limit the discretion of the Authority Having Jurisdiction to use means other than a listing to determine acceptability for special circumstances.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

CANGEMI: See my Explanation of Negative on Proposal 7-7.
SCHUMACHER: Even though it is required that products be listed in other parts of the code, this would make it perfectly clear that this product must be listed to meet the standards of this code.
STEWART: See my Explanation of Negative for Proposal 7-7.

7-55 Log #2034 NEC-P07 (330-10) **Final Action: Accept**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the following text:

~~330.10 Uses Permitted.~~

~~(A) General Uses. Where not subject to physical damage, Type MC cables shall be permitted as follows:~~

~~(1) For services, feeders, and branch circuits~~

~~(2) For power, lighting, control, and signal circuits~~

~~(3) Indoors or outdoors~~

~~(4) Where exposed or concealed~~

~~(5) Direct buried where identified for such use~~

~~(6) In cable tray~~

~~(7) In any raceway~~

~~(8) As open runs of cable~~

~~(9) As aerial cable on a messenger~~

~~(10) In hazardous (classified) locations as permitted in Articles 501, 502, 503, 504, and 505~~

~~(11) In dry locations and embedded in plaster finish on brick or other masonry except in damp or wet locations~~

~~(12) In wet locations where any of the following conditions are met:~~

~~a. The metallic covering is impervious to moisture.~~

~~b. A lead sheath or moisture-impervious jacket is provided under the metal covering.~~

~~c. The insulated conductors under the metallic covering are listed for use in wet locations.~~

~~(13) Where single-conductor cables are used, all phase conductors and, where used, the neutral conductor shall be grouped together to minimize induced voltage on the sheath.~~

~~(B) Specific Uses. Type MC cable shall be installed in compliance with Articles 300, 490, 725, and 770.52 as applicable and in accordance with 330.10(B)(1) through (B)(4).~~

~~(1) Cable Tray. Type MC cable installed in cable tray shall comply with Article 392.~~

~~(2) Direct Buried. Direct-buried cable shall comply with 300.5 or 300.50, as appropriate.~~

~~(3) Installed as Service-Entrance Cable. Type MC cable installed as service-entrance cable shall comply with Article 230.~~

~~(4) Installed Outside of Buildings or as Aerial Cable. Type MC cable installed outside of buildings or as aerial cable shall comply with Article 225 and Article 396.~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This is a companion proposal to revise 320.12 to include the Uses Permitted language.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Permitted in this Article.

330.10(B) is also being deleted since, with the exception of the references to 300.5 and 300.50, the references contained are general references and do not comply with the NEC Style manual.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-8.

GOTHAM: See my Explanation of Negative on Proposal 7-8.

SCHUMACHER: The uses permitted is a quick reference to what the cable can be used for, and is totally separate from uses not permitted. While there may be certain areas where the task group can streamline the uses permitted to make it more economical, using a

permitted. While there may be certain areas where the task group can streamline the uses permitted to make it more economical, using a "shotgun" approach to this will only make the code more confusing to the people in the field.
STEWART: See my Explanation of Negative for Proposal 7-8.

7-56 Log #261 NEC-P07 **Final Action: Accept**
(330-10(A))

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of 330.10(A).
Change 330.10(A)(5) from "(5) Direct buried where identified for such use" to "(5) To be direct buried where identified for such use"

Substantiation:

These changes will permit each of the following 13 list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Accept

Panel Statement:

See panel action on Proposal 7-55.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-57 Log #3124 NEC-P07 **Final Action: Accept in Principle**
(330-10(A)(6))

Submitter: Austin D. Wetherell, Underwriters Laboratories, Inc.

Recommendation:

Should read "(6) In cable tray where identified for such use".

Substantiation:

All MC cables are not suitable. Those with outer jackets must comply with a flame test and are identified "CT use".

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 7-64

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-58 Log #104 NEC-P07 **Final Action: Accept in Principle**
(330-10(A)(4))

Submitter: James M. Daly, General Cable

Recommendation:

Revise (4) as follows:
"(4) ~~Where e~~ Exposed or concealed".
Delete (8) in its entirety.
Renumber (9) through (13) as (8) through (12).

Substantiation:

This is one of a series of proposals to provide consistency throughout the code in the use of the terms "exposed", "open wiring", and "open runs" as applied to wiring methods.
"Exposed" is used 306 times throughout the code, "open runs" is used 7 times, and "open wiring" is used 29 times but only 10 of those instances do not refer to "open wiring on insulators".
Exposed is defined in Article 100 as shown below.
"Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated or insulated."
"Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access."
Open wiring on insulators is defined in 398.2 as "An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings."
"Open runs" is not defined in the code.
This series of proposals will limit the term "open wiring" to open wiring on insulators (Article 398) and have the term "exposed" apply to "open runs" and open wiring not on insulators.
Wire and cable that must be continuously supported and protected will be specifically addressed in the applicable section.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action on Proposal 7-55.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-59 Log #508 NEC-P07 **Final Action: Accept in Part**
(330-10(A)(10))

Submitter: James M. Daly, General Cable

Recommendation:

Revise 330.10(A)(10) as follows:
(10) In hazardous (classified) locations as permitted in ~~Articles 501, 502, 503, 504, and 505~~ 501.4, 502.4, 503.3, 504.20 and 505.15.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept in Part

The panel accepts the deletions but does not accept the added text.

Panel Statement:

See panel action on Proposal 7-55.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-60 Log #509 NEC-P07 **Final Action: Accept in Principle**
(330-10(B))

Submitter: James M. Daly, General Cable

Recommendation:

Revise 330.10(B) as follows:
(B) Specific Uses. Type MC cable shall be permitted to be installed in compliance with ~~Article 300, 490,~~ Parts II and III of Article 725, and 770.52 as applicable and in accordance with 330.10(B)(1) through (B)(4).

Substantiation:

The phrase "permitted to be" should be added to indicate that the type of installation is permitted. The present text only specifies the installation requirements.
Reference to Article 300 is not necessary since 90.3 states that Chapters 1, 2, 3, and 4 apply generally.
Article 490 does not mention MC or metal clad cable and 90.3 states that Chapter 4 applies generally.
The addition of "Parts II and III of Article 725" complies with 4.1.1 of the NEC Style Manual which states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action on Proposal 7-55.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-61 Log #510 NEC-P07 **Final Action: Accept in Principle**
(330-10(B)(1))

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
(1) Cable Tray. Type MC cable installed in cable tray shall comply with ~~Article 392~~ 392.3, 392.4, 392.6, and 392.8 through 392.13.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action on Proposal 7-55.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-62 Log #511 NEC-P07 **Final Action: Accept in Principle**
(330-10(B)(3))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(3) Installed as Service-Entrance Cable. Type MC cable installed as service-entrance cable shall ~~comply with~~ be permitted in accordance with 230.43 ~~Article 230~~.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."
This revision will not only comply with the NEC Style Manual but will also require that the installation of MC cable as service entrance cable comply with the other requirements of Article 230.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action on Proposal 7-55.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-63 Log #512 NEC-P07 **Final Action: Accept in Principle**
(330-10(B)(4))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(4) Installed Outside of Buildings or as Aerial Cable. Type MC cable installed outside of buildings or as aerial cable shall comply with ~~Article 225~~ 225.10 and ~~Article 396, 396.10 and 396.12~~.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 7-55.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-64 Log #2018 NEC-P07 **Final Action: Accept in Principle**
(330-12)

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Revise 330.12 to read as follows:
330.12 Uses Not Permitted. Type MC cables shall not be used under the following conditions or in the following locations:
(1) In damp or wet locations where embedded in plaster finish on brick or other masonry.
(2) Unless the metallic sheath is suitable for the conditions or protected by materials suitable for the conditions, MC Cable shall not be exposed to corrosive conditions in:
a. direct burial applications,
b. concrete,
c. cinder fill, strong chlorides, caustic alkalis, chlorine, or hydrochloric acids,
(3) In wet locations where none of the following conditions are met:
a. The metallic covering is not impervious to moisture.
b. A lead sheath or moisture-impervious jacket is not provided under the metal covering.
c. The insulated conductors under the metallic covering are not listed for use in wet location.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept in Principle

Revise the wording in the proposal to read as follows:
"330.12 Uses Not Permitted. Type MC cables shall not be permitted under the following conditions or in the following locations:
(1) Where subject to physical damage.
(2) Unless the metallic sheath is suitable for the conditions, or protected by materials suitable for the conditions.
(a) Where embedded in plaster finish on brick or other masonry in damp or wet locations .
(b) Exposed to corrosive conditions such as:
1. direct burial applications,
2. concrete encasement,
3. cinder fill, strong chlorides, caustic alkalis, chlorine, or hydrochloric acids
(3) In wet locations, unless one of the following conditions are met:
a. The metallic covering is impervious to moisture.
b. A lead sheath or moisture-impervious jacket is provided under the metal covering.
c. The insulated conductors under the metallic covering are listed for use in wet locations.
(4) For direct burial or concrete encasement, unless identified for the use.
FPN to (3): MC Cable that is identified for direct burial applications is suitable for installation in concrete.
(5) In cable tray where the cable has an outer (nonmetallic) jacket, unless identified for the use."

Panel Statement:

The proposal was revised for clarity, to include items that had been in 330.10(A), and also to require that the cable be identified for direct burial as previously required in 330.10(A)(5).

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

SCHUMACHER: This should be rejected, because getting rid of 330.10 should be rejected.
STEWART: See my Explanation of Negative for Proposal 7-8.

7-65 Log #2116 NEC-P07 **Final Action: Accept**
(330-17)

Submitter: George W. Flach New Orleans, LA

Recommendation:

Revise as follows:
Through or Parallel to Framing Members. Type MC cable shall be protected in accordance with 300.4(A), (C), and (D) where installed through or parallel to framing members.

Substantiation:

To add specific parts of 300.4 that apply to Type MC cable when installed in holes in metal framing members. Some inspectors are requiring bushings in the holes or metal studs where Type MC cable passes through them.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-66 Log #2500 NEC-P07 **Final Action: Accept in Principle**
(330-17)

Submitter: George W. Flach, Nat'l Armored Cable Mfrs' Assn. (NACMA)

Recommendation:

Revise 320.17 as follows:
330.17 Through or Parallel to Framing Members.
Type MC cable shall be protected in accordance with 300.4 where installed through or parallel to framing members.

Substantiation:

300.4(B)(1) contains specific protection requirements for Nonmetallic-Sheathed Cables and Electrical Nonmetallic Tubing through Metal Framing Members. The general reference to 300.4 in 330.17 is being misunderstood to mean that all of the requirements of 300.4 apply to MC cable, including those that specifically reference other wiring methods such as 300.4(B)(1). Adding the suggested text will clarify that requirements that are not applicable to MC cable do not apply.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action on Proposal 7-65.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-67 Log #2659 NEC-P07 **Final Action: Accept in Principle**
(330-17)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation:

Revise existing Section 330.17 as follows:
320.17 Through or Parallel to Framing Members.
Type MC cable shall be protected in accordance with 300.4 where installed through or parallel to framing members.
Exception: The installation of Type MC cable shall not be required to comply with 300.4(B).

Substantiation:

Listed Type MC cable provides excellent protection from physical damage in compliance with the UL Product Safety Standard. It is suitable for installation in metal framing members without the bushings required for Type NM cable and electrical nonmetallic tubing.
While the title of 300.4(B) is "Nonmetallic-Sheathed Cables and Electrical Nonmetallic Tubing Through Metal Framing Members," some inspection authorities have interpreted Section 330.17 to require compliance with all of 300.4, even (B). This does not seem to be the intent of CMP-7 or of CMP-3.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action on Proposal 7-65.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-68 Log #3323 NEC-P07 **Final Action: Accept in Principle**
(330-17)

Submitter: George W. Flach, Nat'l Armored Cable Mfrs' Assn. (NACMA)

Recommendation:

Revise 330.17 as follows:
330.17 Through or Parallel to Framing Members.
Type MC cable shall be protected in accordance with 300.4 as applicable where installed through or parallel to framing members.

Substantiation:

300.4(B)(1) contains specific protection requirements for Nonmetallic-Sheathed Cables and Electrical Nonmetallic Tubing through Metal Framing Members. The general reference to 300.4 in 330.17 is being misunderstood to mean that all of the requirements of 300.4 apply to MC cable, including those that specifically reference other wiring methods such as 300.4(B)(1). Adding the suggested text will clarify that requirements that are not applicable to MC cable do not apply.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action on Proposal 7-65.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-69 Log #953 NEC-P07 **Final Action: Reject**
(330-30)

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Revise text to read as follows:
"...concealed in or under...".

Substantiation:

As presently worded, it is not clear that it is permissible to fish cable through, for example, a permanently-dry crawlspace. Not all would consider such a location "in" the structure. Yet it can offer a similar level of protection to spaces in a structure. It has to be dry, and it cannot be subject to mechanical harm, in accordance with 330-10 and 330-12.

Panel Meeting Action: Reject

Panel Statement:

Crawlspace, by definition, is accessible. The proposed wording does not enhance clarity. Additionally, it may be in contact with the earth and, thereby, subject to damp, wet, and corrosive conditions.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-70 Log #1064 NEC-P07 **Final Action: Reject**
(330-30)

Submitter: Mark T. Rochon, Mark J. Rochon Master Electrician

Recommendation:

Revise text to read as follows:
Type MC cable shall be secured by staples, cable ties, straps, hangers, or similar fittings designed and installed so as not to damage the cable at intervals not exceeding 1.8 m (6 ft) and within 300 mm (12 in.) of every outlet box, junction box, cabinet or fitting.

Substantiation:

MC cable is being used on a daily basis, in place of armored cable, and is not being supported properly by approved means. There is no description of an approved supporting method in this article.

Panel Meeting Action: Reject

Panel Statement:

The panel does not agree that all sizes of MC cable must be secured within 300 mm (12 in.) of every outlet box.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-71 Log #1098 NEC-P07 **Final Action: Reject**
(330-30)

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence.
All support straps, clips, hangers, and similar support hardware shall be identified for the purpose.

Substantiation:

Conduit straps, clips, hangers may not be considered "fittings".
According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

The current requirement is that the securing means be designed and installed so as to not damage the cable. Support and securing can be achieved in many ways and standard hardware items are generally acceptable. To require each of these items to be identified for each purpose, is overly restrictive. There is insufficient substantiation to support the change.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-72 Log #1099 NEC-P07 **Final Action: Accept in Principle**
(330-30)

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Revise text:
Type MC cable shall be supported and secured at intervals not exceeding 1.8m (6ft), by staples, cables ties, straps, hangers, or similar fittings designed and installed so as not to damage the cable.

Substantiation:

Many inspectors will not allow some of these types of supporting means because there are no specific types in the code book.

Panel Meeting Action: Accept in Principle

Panel Statement:

See the panel action and statement on Proposal 7-73.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-73 Log #1717 NEC-P07 (330-30) **Final Action: Accept in Principle in Part**

TCC Action:

The Technical Correlating Committee understands that in the panel action in (B)(2) that the last sentence is not being revised. Instead, an additional sentence is being added to the end of (B)(2).

Submitter: Thomas E. Trainor, City of San Diego / Rep. IAEI

Recommendation:

Revise 330.30 to read as follows:

330.30 Securing and Supporting. Type MC cable shall be supported and secured by staples, cable ties, straps, hangers, or similar fittings, designed and installed so as not to damage the cable, at intervals not exceeding 1.8 m (6 ft) and within 1.8 mm (6 ft) of every outlet box, junction box, cabinet, or fitting. Cables containing four or fewer conductors, sized no larger than 10 AWG, shall be secured within 300 mm (12 in) of every box, cabinet, fitting, or other cable termination. [Note: Last sentence relocated from C. which is changed to Cable Trays]

(A) Horizontal Runs Through Holes and Notches. In other than vertical runs, cables installed in accordance with 300.4 shall be considered supported and secured where such support does not exceed 1.8 m (6 ft) intervals.

(B) Unsupported Cables. Type MC cable shall be permitted to be unsupported where the cable:

(1) Is fished between access points, ~~where~~ through concealed spaces in finished buildings or structures and supporting is impracticable; or

(2) Is not more than 1.8 m (6 ft) in length from the last point of cable support ~~for~~ to the point of connections ~~within an accessible ceiling~~ to a luminaire~~(s)~~ ([lighting fixture~~(s)~~]) or other piece of electrical equipment and the cable and point of connection are within an accessible ceiling.

~~(C) At Terminations. Cables containing four or fewer conductors, sized no larger than 10 AWG, shall be secured within 300 mm (12 in) of every box, cabinet, fitting, or other cable termination.~~

Cable Trays. Type MC cable installed in cable trays shall comply with 392.8(B).

If the proposed revisions are accepted, the section will read as follows:

330.30 Securing and Supporting. Type MC cable shall be supported and secured by staples, cable ties, straps, hangers, or similar fittings, designed and installed so as not to damage the cable, at intervals not exceeding 1.8 m (6 ft) and within 1.8 mm (6 ft) of every outlet box, junction box, cabinet, or fitting. Cables containing four or fewer conductors, sized no larger than 10 AWG, shall be secured within 300 mm (12 in) of every box, cabinet, fitting, or other cable termination.

(A) Horizontal Runs Through Holes and Notches. In other than vertical runs, cables installed in accordance with 300.4 shall be considered supported and secured where such support does not exceed 1.8 m (6 ft) intervals.

(B) Unsupported Cables. Type MC cable shall be permitted to be unsupported where the cable:

(1) Is fished between access points through concealed spaces in finished buildings or structures and supporting is impracticable; or

(2) Is not more than 1.8 m (6 ft) in length from the last point of cable support to the point of connection to a luminaire (lighting fixture) or other piece of electrical equipment and the cable and point of connection are within an accessible ceiling.

(C) Cable Trays. Type MC cable installed in cable trays shall comply with 392.8(B).

Substantiation:

Editorial changes which, with companion proposals, are intended to provide consistent wording for the securing and supporting requirements in 334, 320, 330 and 332.

Panel Meeting Action: Accept in Principle in Part

In the recommended text, first sentence, add "or other approved means" after "fittings."

In the first paragraph, the panel does not Accept the addition of the wording "and within 1.8 mm (6 ft) of every outlet box, junction box, cabinet, or fitting." or Item (C).

In (A), change "300.4" to "330.17".

In (B)(1), delete the comma after the word "points".

In (B)(2), revise the last sentence to read as follows:

"For the purposes of this section, Type MC cable fittings shall be permitted as a means of cable support."

Panel Statement:

The phrase was not Accepted by the panel since it is already required earlier in the sentence.

(C) was not Accepted since the requirement already exists in 392.8(B).

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-74 Log #2687 NEC-P07 **Final Action: Reject**
(330-30)

Submitter: Phil Simmons, Simmons Electrical Services / Rep. National Armored Cable Manufacturers Assn.

Recommendation:

Revise existing Section 330.30 as follows:

330.30 Securing and Supporting.

(A) General. Type MC cable shall be secured and supported by connectors, staples, cable ties, straps, hangers, or similar fittings designed and installed so as not to damage the cable ~~at intervals not exceeding 1.8 m (6 ft).~~

(B) Securing. Unless otherwise provided, cables containing four or fewer conductors, sized no larger than 10 AWG, shall be secured within 300 mm (12 in.) of every box, cabinet, fitting, or other cable termination and at intervals not exceeding 1.8 m (6 ft) where installed on or across the surface of framing members.

(C) Supporting. Cable shall be supported at intervals not exceeding 1.8 m (6 ft).

(1) ~~(A)~~ **Horizontal Runs Through Holes and Notches.** ~~In other than vertical runs~~, Cables installed in wooden or metal framing members ~~accordance with 300.4~~ shall be considered supported ~~and secured~~ where such support does not exceed 1.8-m (6-ft) intervals.

(D) ~~**(B)**~~ **Unsupported Cables.** Type MC cable shall be permitted to be unsupported where the cable:

(1) Is fished between access points, where concealed in finished buildings or structures and supporting is impracticable

(2) Is not more than 600 mm (2 ft) in length at terminals where flexibility is necessary

(3) Is not more than 1.8 m (6 ft) from the last point of support for connections within an accessible ceiling to luminaire(s) [lighting fixture(s)] or equipment

(E) Cable Trays. Type MC cable installed in cable trays shall comply with 392.8(B).

~~(C) At Terminations. Cables containing four or fewer conductors, sized no larger than 10 AWG, shall be secured within 300 mm (12 in.) of every box, cabinet, fitting, or other cable termination.~~

Substantiation:

This proposal intends to correlate the requirements for supporting Type MC cable with that of Type AC cable in 320.30. The fact that this section is silent on acceptable methods for supporting and securing Type MC cable has caused several problems in the enforcement community. Some inspectors are reluctant to permit support methods such as bridle rings since this section does not specifically name them or similar methods. Support of Type MC cables by bridle rings is included in Section 310.15(B)(2)(a) Exception No. 5 and has been a satisfactory method of support of metal-clad cables for many years.

The new subsection (A) General is proposed to give a title to the opening paragraph and include requirements here that apply generally to all cable installations including securing and supporting the cable.

The word "connector" is proposed for the opening sentence as cable connectors both secure the cable to an enclosure such as a box or luminaire (lighting fixture) as well as support the cable.

The substantiation for moving the text regarding securing the cable within 300 mm (12 in.) of each box, cabinet, conduit body, or other Type MC cable termination to the new (B) Securing is this rule should apply to both vertical as well as horizontal installations.

A new Section 330.30(D)(2) is proposed to correlate with a permitted use for Type AC cable in Section 320.30(B)(2) as Type MC cable in the branch circuit sizes equivalent to Type AC cable is equally as flexible and such a permitted use is warranted.

The language regarding cables being installed in accordance with 300.4 seems inappropriate as the issue here is whether the wooden or metal framing members adequately supports the cable not whether the cable complies with the protection requirements of 300.4. Protection of Type MC cable installed in or on framing members is adequately covered in 330.17 and 330.23.

Other changes are intended to be editorial.

Panel Meeting Action: Reject

Panel Statement:

No technical substantiation was provided to justify the change in distance for securing and supporting.

The addition of the word "connector" would eliminate the requirement to secure and support the cable within 12 inches of an outlet box or termination.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-75 Log #3347 NEC-P07 **Final Action: Accept in Principle**
(330-30)

Submitter: Charles J. Palmieri, Palmieri Assoc.

Recommendation:

Add the following to indicate how Metal Clad Cable is to be supported.

330.30 Securing and Supporting.

Type MC cable shall be supported and secured by cable ties, straps, hangers, or similar fittings designed and installed so as not to damage the cable at intervals not exceeding 1.8 m (6 ft).

Substantiation:

Currently, this section does not indicate how type MC is to be supported. It is not uncommon to see this cable supported by mechanics wire or tape. The methods included in the new text are similar to those recognized by other cable wiring methods. There are a number of products that are listed as type MC cable supports. Cable ties are increasing in popularity and are often employed as a support for type MC Cable. The current edition of the Code recognizes cable ties as support for both type NM and Armored Cable.

Panel Meeting Action: Accept in Principle

Panel Statement:

See the panel action and statement on Proposal 7-73.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-76 Log #2412 NEC-P07 **Final Action: Reject**
(330-30(B)(2))

Submitter: Wayne Sargent, City of Salem, Oregon

Recommendation:

(B) Unsupported Cables. Type MC cable shall be permitted to be unsupported where the cable:
(2) Does not rest on the ceiling grid as prohibited by 300.11(A) and is not more than 1.8 m (6 ft) from the last point of support for connections within an accessible ceiling to luminaire(s) [lighting fixture(s)] or equipment.

Substantiation:

The problem is an apparent conflict between the intent of 300.11(A) to keep cables and raceways off of the ceiling grid system, and the three wiring methods [AC, MC and NM cable] permitted to be unsupported in short lengths. With recent changes to Chapter 8, it appears to be the intent of the NEC to clean up the area above suspended ceilings. These short unsupported "whips" above grids are often installed in standard 1.8 m [6 foot] lengths. Most electricians tie these up in some way; however, many times they are left laying on the grid. If it is only 2 feet from the j-box to the luminaire, there can be 4 feet of cable resting on the ceiling grid if they interpret the permission to be unsupported that is granted by the applicable wiring method section [320.30(B)(3), 330.30(B)(2), and 334.30(B)(2)], as permission to ignore 300.11(A).

Panel Meeting Action: Reject

Panel Statement:

This requirement is already in place in 300.11(A).

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-77 Log #314 NEC-P07 **Final Action: Reject**
(330-40)

Submitter: Rene Loubet, Rene' Loubet Electric

Recommendation:

Add additional wording to read as follows:
"Fittings used for connecting type MC cable to boxes, cabinets, or other equipment shall be listed and identified for such use. An insulating bushing or its equivalent shall be provided between the conductors and the armor as to afford adequate protection for the conductors. The fittings used to connect type MC cable to boxes, cabinets or other equipment shall be of such design that the insulating bushing or its equivalent will be visible for inspection."

Substantiation:

As the armor of type MC cable is cut, a sharp edge is incurred on the inner part of the jacket subjecting the insulation of the conductors to be cut and exposing the conductor. With the use of an insulating bushing or its equivalent, this damage would be eliminated. A problem that I have encountered is when a clamp style connector is used on aluminum jacketed MC cable, overtightening of the screws can cause the cable to collapse inward damaging the insulation on the conductors.

Panel Meeting Action: Reject

Panel Statement:

Anti-short bushings are not required for Type MC cable in accordance with the listing of the product. The termination fittings approved for use with Type MC cable are designed such that the wires will not come in contact with the cut edge of the armor since the throat of the fitting is small enough to prevent contact with the armor. Type MC termination fittings perform the same function for Type MC cable as Type AC terminations, plus the anti-short bushing does for Type AC cable.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-78 Log #1437 NEC-P07 **Final Action: Reject**
(330-40)

Submitter: Patrick Weldon Apple Valley, MN

Recommendation:

Revise text to read as follows:
330.40 Boxes and Fitting. Fittings used for connecting Type MC cable to boxes, cabinets, or other equipment shall be listed and identified for such use, and, in addition, an insulating bushing or its equivalent protection shall be provided between the conductors and the interlocking armor or corrugated sheath. The connector or clamp by which the Type MC cable is fastened to boxes or cabinets shall be of such design that the insulating bushing or its equivalent will be visible for inspection.

Substantiation:

To provide the same protection as required for Type AC cable (320.40). The risk for damage to the conductors due to sharp edges is just as likely. Several manufacturers include such insulating bushings with the MC cables and recommend their use.

Panel Meeting Action: Reject

Panel Statement:

Anti-short bushings are not required for Type MC cable in accordance with the listing of the product. The termination fittings approved for use with Type MC cable are designed such that the wires will not come in contact with the cut edge of the armor since the throat of the fitting is small enough to prevent contact with the armor. Type MC termination fittings perform the same function for Type MC cable as Type AC terminations, plus the anti-short bushing does for Type AC cable.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-79 Log #1844 NEC-P07 **Final Action: Reject**
(330-40)

Submitter: Francis C. Pologruto Berlin, NJ

Recommendation:

Add the same paragraph for boxes and fittings as stated in 320.40 (boxes and fittings).

Substantiation:

330.40 is short, where as the statement in Article 320.40 explains the purpose of the fittings and clamps on boxes which is more explanatory for the person who reads this particular paragraph.

Panel Meeting Action: Reject

Panel Statement:

Anti-short bushings are not required for Type MC cable in accordance with the listing of the product. The termination fittings approved for use with Type MC cable are designed such that the wires will not come in contact with the cut edge of the armor since the throat of the fitting is small enough to prevent contact with the armor. Type MC termination fittings perform the same function for Type MC cable as Type AC terminations, plus the anti-short bushing does for Type AC cable.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-80 Log #2284 NEC-P07 **Final Action: Reject**
(330-40)

Submitter: Andy Chambers, Enterprise Electric / Rep. Labor

Recommendation:

Add new text as follows:
MC cable shall have an anti-short inserted to protect conductors from the sheathing.

Substantiation:

This will prevent ground faults and shorts at the connectors. Connectors do not provide protection between the conductors and the metal sheath.

Panel Meeting Action: Reject

Panel Statement:

Anti-short bushings are not required for Type MC cable in accordance with the listing of the product. The termination fittings approved for use with Type MC cable are designed such that the wires will not come in contact with the cut edge of the armor since the throat of the fitting is small enough to prevent contact with the armor. Type MC termination fittings perform the same function for Type MC cable as Type AC terminations, plus the anti-short bushing does for Type AC cable.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-81 Log #105 NEC-P07 **Final Action: Accept**
(330-80(B))

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
"... installed on a messenger or exposed ~~as open runs~~ with a maintained...".

Substantiation:

This is one of a series of proposals to provide consistency throughout the code in the use of the terms "exposed", "open wiring", and "open runs" as applied to wiring methods.

"Exposed" is used 306 times throughout the code, "open runs" is used 7 times, and "open wiring" is used 29 times but only 10 of those instances do not refer to "open wiring on insulators".

Exposed is defined in Article 100 as shown below.

"Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated or insulated."

"Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access."

Open wiring on insulators is defined in 398.2 as "An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings."

"Open runs" is not defined in the code.

This series of proposals will limit the term "open wiring" to open wiring on insulators (Article 398) and have the term "exposed" apply to "open runs" and open wiring not on insulators.

Wire and cable that must be continuously supported and protected will be specifically addressed in the applicable section.

Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

7-82 Log #513 NEC-P07 **Final Action: Accept**
(330-108)

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
330.108 Equipment Grounding. Type MC cable shall provide an adequate path for equipment grounding ~~as required by Article 250~~.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

90.3 states that Chapters 1, 2, 3, and 4 apply generally.

Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

7-83 Log #2942 NEC-P07 **Final Action: Reject**
(332-6 (New))

Submitter: Martin J. Brett, Jr.

Recommendation:

Revise text as follows:
332.6 Listing Requirements. Type MI cable and associated fittings shall be listed.

Substantiation:

As the supply chain becomes more global and the acceptance of the NEC grows internationally, it is important to clearly state the intent to require a listed product. Also, with the introduction of the common numbering system last cycle, xxx.6 was reserved for "Listing Requirements". Without an entry for 332.6 in this renumbered article, it could be assumed that these products do not need to be listed. The objective is to guarantee that Type MI cables installed in accordance with this article meet a minimum standard of performance for safety. The intent is that this product be evaluated and listed in accordance with the appropriate product standard.

Panel Meeting Action: Reject

Panel Statement:

There are several methods of approving products. One method should not be defined to the exclusion of the others.

Substantiation has not been provided to indicate that there is a problem with the current products. Standard products are listed, however, products designed for special applications or conditions may not fit the listing criteria. This change would limit the discretion of the Authority Having Jurisdiction to use means other than a listing to determine acceptability for special circumstances.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-7.
CANGEMI: See my Explanation of Negative on Proposal 7-7.
SCHUMACHER: Even though it is required that products be listed in other parts of the code, this would make it perfectly clear that this product must be listed to meet the standards of this code.
STEWART: See my Explanation of Negative for Proposal 7-7.

7-84 Log #262 NEC-P07 **Final Action: Accept**
(332-10)

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the sentence.
Change 332.10(6) from "(6) Embedded in plaster, concrete, fill, or other masonry, whether above or below grade" to "Where embedded in plaster, concrete, fill, or other masonry, whether above or below grade".

Substantiation:

These changes will permit each of the following 10 list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-85 Log #1716 NEC-P07 **Final Action: Accept**
(332-10)

Submitter: Thomas E. Trainor, City of San Diego / Rep. IAEI

Recommendation:

Revise 332.10 to read as follows:
332.10 Uses Permitted. Type MI cable shall be permitted as follows:
(11) In or attached to cable tray

Substantiation:

Recognizing a use for MI Cable which is presently permitted but not included in 332.10.

Panel Meeting Action: Accept

Panel Statement:

The panel understands that the action on this proposal will be superceded by the action taken on Proposals 7-86 and 7-88.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-86 Log #2035 NEC-P07 **Final Action: Accept**
(332-10)

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the following text:

~~332.10 Uses Permitted.~~

~~Type MI cable shall be permitted as follows:~~

~~(1) For services, feeders, and branch circuits~~

~~(2) For power, lighting, control, and signal circuits~~

~~(3) In dry, wet, or continuously moist locations~~

~~(4) Indoors or outdoors~~

~~(5) Where exposed or concealed~~

~~(6) Embedded in plaster, concrete, fill, or other masonry, whether above or below grade~~

~~(7) In any hazardous (classified) location~~

~~(8) Where exposed to oil and gasoline~~

~~(9) Where exposed to corrosive conditions not deteriorating to its sheath~~

~~(10) In underground runs where suitably protected against physical damage and corrosive conditions~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This is a companion proposal to revise 332.12 to include the Uses Permitted Language.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-8.

GOTHAM: See my Explanation of Negative on Proposal 7-8.

SCHUMACHER: The uses permitted is a quick reference to what the cable can be used for, and is totally separate from uses not permitted. While there may be certain areas where the task group can streamline the uses permitted to make it more economical, using a "shotgun" approach to this will only make the code more confusing to the people in the field.

STEWART: See my Explanation of Negative for Proposal 7-8.

7-87 Log #768 NEC-P07 **Final Action: Accept in Principle in Part**
(332-12)

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise:

Type MI cable shall not be used: (1) Where exposed to ~~conditions~~ agents that ~~are corrosive to~~ have a deteriorating effect on the metallic sheath unless additionally protected by materials suitable for the purpose. (2) Where likely to be subject to severe physical damage.

Substantiation:

Present wording appears to address damage from deteriorating agents, not physical force damage. There should be a requirement re: severe physical damage as in 358.12 for EMT.

Panel Meeting Action: Accept in Principle in Part

The panel Rejects changing "conditions" to "agents", and Accepts in Principle the added phrase in the first sentence and (2).

Panel Statement:

See Panel Action on Proposal 7-88. "Conditions" is a more encompassing term than "agents".

EMT does not have the equivalent crush resistance as MI cable.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-88 Log #2019 NEC-P07 (332-12) **Final Action: Accept in Principle**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Change the Uses Not Permitted to the following:

332.12 Uses Not Permitted. Type MI cable shall not be used under the following conditions or in the following locations:

(1) In underground runs unless:

a. suitably protected from physical damage

b. suitably protected from any corrosive conditions that could affect the metallic sheath.

(2) Where exposed to conditions that are destructive and corrosive to the metallic sheath unless additionally protected by materials suitable for the conditions.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept in Principle

Revise the recommended text to read as follows:

"332.12 Uses Not Permitted. Type MI Cable shall not be used under the following conditions or in the following locations:

(1) In underground runs unless protected from physical damage.

(2) Where exposed to conditions that are destructive and corrosive to the metallic sheath unless additional protection is provided."

Panel Statement:

Table 3.2.1 of the NEC Style Manual lists "suitable" as being possibly unenforceable and a vague term. (1)b. is addressed in (2).

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-12.

SCHUMACHER: This should be rejected, because Proposal 7-86 should be rejected.

STEWART: See my Explanation of Negative for Proposal 7-8.

7-89 Log #1100 NEC-P07 **Final Action: Reject**
(332-30 (New))

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence.
All support straps, clips, hangers, and similar support hardware shall be identified for the purpose.

Substantiation:

Conduit straps, clips, hangers may not be considered "fittings".
According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

The current requirement is that the hardware be designed and installed so as not to damage the cable; identification is not considered necessary.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-90 Log #1715 NEC-P07 **Final Action: Accept in Principle in Part**
(332-30)

Submitter: Thomas E. Trainor, City of San Diego / Rep. IAEI

Recommendation:

Revise 332.30 to read as follows:

332.30 Securing and Supporting. Type MI cable shall be supported ~~securely~~ and secured by staples, straps, hangers, or similar fittings, designed and installed so as not to damage the cable, at intervals not exceeding 1.8 m (6 ft) and within 1.8 mm (6 ft) of every outlet box, junction box, cabinet, or fitting.

(A) Horizontal Runs Through Holes and Notches. In other than vertical runs, cables installed in accordance with 300.4 shall be considered supported and secured where such support does not exceed 1.8 m (6 ft) intervals.

(B) Unsupported Cable. Type MI cable shall be permitted to be unsupported where the cable is fished between access points through concealed spaces in finished buildings or structures and supporting is impracticable.

(C) Cable Trays. Type MI cable installed in cable trays shall comply with 392.8(B). Type MI Cable attached to cable trays shall comply with 392.6(J).

If the proposed revisions are accepted, the section will read as follows:

332.30 Securing and Supporting. Type MI cable shall be supported and secured by staples, straps, hangers, or similar fittings, designed and installed so as not to damage the cable, at intervals not exceeding 1.8 m (6 ft) and within 1.8 mm (6 ft) of every outlet box, junction box, cabinet, or fitting.

(A) Horizontal Runs Through Holes and Notches. In other than vertical runs, cables installed in accordance with 300.4 shall be considered supported and secured where such support does not exceed 1.8 m (6 ft) intervals.

(B) Unsupported Cable. Type MI cable shall be permitted to be unsupported where the cable is fished between access points through concealed spaces in finished buildings or structures and supporting is impracticable.

(C) Cable Trays. Type MI cable installed in cable trays shall comply with 392.8(B). Type MI Cable attached to cable trays shall comply with 392.6(J).

Substantiation:

Editorial changes which, with companion proposals, are intended to provide consistent wording for the securing and supporting requirements in 334, 320, 330 and 332.

Panel Meeting Action: Accept in Principle in Part

Revise the Recommended wording to read as follows:

"332.30 Securing and Supporting. Type MI cable shall be supported and secured by staples, straps, hangers, or similar fittings, designed and installed so as not to damage the cable, at intervals not exceeding 1.8 m (6 ft).

(A) Horizontal Runs Through Holes and Notches. In other than vertical runs, cables installed in accordance with 300.4 shall be considered supported and secured where such support does not exceed 1.8 m (6 ft) intervals.

(B) Unsupported Cable. Type MI cable shall be permitted to be unsupported where the cable is fished between access points through concealed spaces in finished buildings or structures and supporting is impracticable."

Panel Statement:

The deleted phrase is already required earlier in the sentence. 1.8 mm should have been 1.8 m. The panel does not Accept proposed (C), since it is already covered in Article 392.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-91 Log #1366 NEC-P07 **Final Action: Reject**
(332-60)

Submitter: David Sroka Turner Falls, MA

Recommendation:

Add a paragraph 332.60 to read as follows:
332.60 Termination. Type MI cables sized #6 AWG and larger shall terminate in a compression pigtail fitting of stranded copper. The stranded copper shall not be reduced in ampacity.

Substantiation:

Solid copper makes a poor connection in the circuit breaker as it is round and does not compress. Further, Table 8 which breakers comply with only lists single conductors sized #8 AWG and smaller.

Panel Meeting Action: Reject

Panel Statement:

The circuit breaker must be used in accordance with its listing. The recommendation is not currently precluded in the Code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-92 Log #106 NEC-P07 **Final Action: Accept**
(332-80(B))

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
"... installed on a messenger or exposed ~~as open runs~~ with a maintained...".

Substantiation:

This is one of a series of proposals to provide consistency throughout the code in the use of the terms "exposed", "open wiring", and "open runs" as applied to wiring methods.
"Exposed" is used 306 times throughout the code, "open runs" is used 7 times, and "open wiring" is used 29 times but only 10 of those instances do not refer to "open wiring on insulators".
Exposed is defined in Article 100 as shown below.
"Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated or insulated."
"Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access."
Open wiring on insulators is defined in 398.2 as "An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings."
"Open runs" is not defined in the code.
This series of proposals will limit the term "open wiring" to open wiring on insulators (Article 398) and have the term "exposed" apply to "open runs" and open wiring not on insulators.
Wire and cable that must be continuously supported and protected will be specifically addressed in the applicable section.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-93 Log #48 NEC-P07 **Final Action: Accept**
(332-104)

NOTE: The following proposal consists of Comment 7-12 on Proposal 7-87 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 7-87 was:
Revise 330-20 as follows:
"Type MI cable conductors shall be of solid copper or nickel-clad copper with a resistance corresponding to standard AWG and kcmil sizes."
Comment 7-12 received the following Technical Correlating Committee Note:
It was the action of the Technical Correlating Committee that Comment 7-12 be reported as "Hold" since it introduces new material that has not had public review.

Submitter: James M. Daly, BICC General

Recommendation:

The proposal should be accepted in principle.
The section should be revised as follows:
Type MI cable conductors shall be of solid copper, nickel or nickel-coated ~~clad~~ copper with a resistance corresponding to standard AWG and kcmil sizes.

Substantiation:

The addition of the word "nickel" and the change of "clad" to "coated" will make the text consistent with the text used in Table 310-13 (PFAH and TFE), Tables 310-18 and 310-19, and Table 402-3 (PAF and PTF).
Many petroleum and chemical companies require both power and control cables that can withstand extreme fire conditions (1093°C (2000°F)) for a short period of time (20 to 30 minutes) to permit a safe shutdown of the process to protect personnel and to minimize damage to the facility. Since copper and nickel-coated copper conductors melt at 1082°C (1938°F), the only alternative is the use of solid nickel conductors which have a melting point of 1455°C (2651°F).

Panel Meeting Action: Accept

Panel Statement:

The panel notes that the wording is in the 2002 Code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-94 Log #1888 NEC-P07 **Final Action: Reject**
(332-108)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
332.108 Equipment Grounding. Where the outer sheath is made of copper, it shall provide an adequate path for equipment grounding bonding purposes. Where made of steel, an equipment ~~grounding~~ bonding conductor shall be provided.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

The Panel agrees that there is confusion in the field surrounding these two terms and supports the concept of this change. However, the decision to use the terms "grounding" or "bonding" is the responsibility of Code-Making Panel 5. Code-Making Panel 7 requests that the Technical Correlating Committee appoint a Task Group to study the impact of such a change. Code-Making Panel 7 requests the opportunity to review any changes of these terms that are under their purview.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

STRANIERO: See my Comment on Affirmative on Proposal 7-1.

7-95 Log #3018 NEC-P07 **Final Action: Reject**
(332-108 Exception (New))

Submitter: James Conrad, Rockbestors-Surprenant Cable Corp.

Recommendation:

Add exception after 332.108 to read:
Exception: When single conductor cables are sized from Table 310.17 a separate equipment grounding conductor shall be used.

Substantiation:

The conductor sizes found in Table 250.122 are coordinated with the ampacities from Table 310.16, the 90°C column. This is the same value used by UL when testing sheaths as an equipment grounding conductor. The copper sheath of the MI cable has never been third party tested as an equipment ground when used at the ampacities allowed from Table 310.17.

Panel Meeting Action: Reject

Panel Statement:

The existing text in 332.108 addresses the submitter's concern. The outer sheath of each single conductor MI cable must comply with the requirements for an equipment grounding conductor.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-96 Log #1525 NEC-P07 **Final Action: Accept in Principle in Part**
(334-2)

Submitter: James M. Daly, General Cable

Recommendation:

Revise 334.2 as follows:
334.2 Definitions.
Nonmetallic-Sheathed Cable. A factory assembly of two or more insulated conductors ~~having~~ enclosed within an overall ~~outer sheath of~~ nonmetallic ~~material~~ jacket.
Type NM. A factory assembly of two or more insulated power or control conductors enclosed within an overall, nonmetallic jacket.
Type NMC. A factory assembly of two or more insulated power or control conductors enclosed within an overall, corrosion resistant, nonmetallic jacket.
Type NMS. A factory assembly of two or more insulated power, control, data, or communications conductors enclosed within an overall nonmetallic jacket.

Substantiation:

Adding definitions of the three types on NM cable will enhance the usability of the Code. The industry will know exactly what each type designation indicates.
The term "sheath" is used for both metallic and nonmetallic materials. The term "jacket" is explicit in meaning a nonmetallic overall covering.

Panel Meeting Action: Accept in Principle in Part

Revise the recommended wording to read as follows:
"334.2 Definitions.
Nonmetallic-Sheathed Cable. A factory assembly of two or more insulated conductors enclosed within an overall nonmetallic jacket.
Type NM. Insulated conductors enclosed within an overall nonmetallic jacket.
Type NMC. Insulated conductors enclosed within an overall, corrosion resistant, nonmetallic jacket.
Type NMS. Insulated power or control conductors with signaling, data, and communications conductors within an overall nonmetallic jacket."

Panel Statement:

Section 2.2.2 of the NEC Style Manual specifies "Definitions". The proposal as revised by the panel action complies with the submitter's intent.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-97 Log #2036 NEC-P07 **Final Action: Reject**
(334-2)

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Revise the existing definition of NM cable in 334.2 to read as follows:

334.2 Definition.

Nonmetallic-Sheathed Cable. A factory assembly of two or more insulated conductors having an outer sheath of nonmetallic material.

Type NM. A type of nonmetallic-sheathed cable used in normally dry locations.

Type NMC. A type of nonmetallic-sheathed cable used in normally dry, moist, damp, or corrosive locations.

Type NMS. A type of nonmetallic-sheathed cable containing power conductors, signaling, and communciations conductors within the same outer sheath and used in normally dry locations.

Substantiation:

This information was previously located under "uses permitted" and should more appropriately be inserted within Section 334.15(B) since this section is dealing with protection from physical damage.

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This is a companion proposal to revise 334.12 to include the Uses Permitted Language.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

The proposed text "used in…" includes recommendations regarding the use of the cable type. Section 2.2.2 of the NEC Style Manual states that "Definitions shall not contain requirements or recommendations." These uses are addressed in existing 334.12(10) and proposed 334.12(13) in Proposal 7-115.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-99 Log #2038 NEC-P07 (334-10) **Final Action: Accept**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the following text:

~~334.10 Uses Permitted.~~

~~Type NM, Type NMC, and Type NMS cables shall be permitted to be used in the following:~~

~~(1) One- and two-family dwellings.~~

~~(2) Multifamily dwellings permitted to be of Types III, IV, and V construction except as prohibited in 334.12.~~

~~(3) Other structures permitted to be of Types III, IV, and V construction except as prohibited in 334.12. Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.~~

~~FPN No. 1:Building constructions are defined in NFPA 220-1999, Standard on Types of Building Construction, or the applicable building code, or both.~~

~~FPN No. 2:See Annex E for determination of building types [NFPA 220, Table 3-1].~~

~~(4) Cable trays, where the cables are identified for the use.~~

~~FPN:See 310.10 for temperature limitation of conductors.~~

~~(A) Type NM. Type NM cable shall be permitted as follows:~~

~~(1) For both exposed and concealed work in normally dry locations except as prohibited in 334.10(3).~~

~~(2) To be installed or fished in air voids in masonry block or tile walls~~

~~(B) Type NMC. Type NMC cable shall be permitted as follows:~~

~~(1) For both exposed and concealed work in dry, moist, damp, or corrosive locations, except as prohibited in 334.10(3)~~

~~(2) In outside and inside walls of masonry block or tile~~

~~(3) In a shallow chase in masonry, concrete, or adobe protected against nails or screws by a steel plate at least 1.59 mm (1/16 in.) thick and covered with plaster, adobe, or similar finish~~

~~(C) Type NMS. Type NMS cable shall be permitted as follows:~~

~~(1) For both exposed and concealed work in normally dry locations except as prohibited in 334.10(3)~~

~~(2) To be installed or fished in air voids in masonry block or tile walls~~

~~(3) To be used as permitted in Article 780~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to two other proposals to change the Uses Not Permitted in this Article and to provide additional text for definitions of NM cable.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-8.

SCHUMACHER: The uses permitted is a quick reference to what the cable can be used for, and is totally separate from uses not permitted. While there may be certain areas where the task group can streamline the uses permitted to make it more economical, using a "shotgun" approach to this will only make the code more confusing to the people in the field.

STEWART: See my Explanation of Negative for Proposal 7-8.

7-102 Log #2893 NEC-P07 **Final Action: Reject**
(334-10)

Submitter: Sam W. Francis, American Forest & Paper Association

Recommendation:

Revise text to read as follows:
Type NM, Type NMC, and Type NMS cables shall be permitted to be used in the following:
(3) Other structures permitted to be of Types III, IV, and V construction except as prohibited in 334.12. ~~Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.~~
334.12(1) ~~As open runs in dropped or suspended ceilings in other than one- and two-family and multifamily dwellings.~~

Substantiation:

Among the provisions the Task Group (TG) forwarded to Panel 7 were revisions to the existing permitted uses of NM cable. One of the results of these changes was to prohibit use of NM cable in occupancies other than single family or multifamily residential within certain restrictions unless it was covered by a system with a 15-minute finish rating. Previous editions of the NEC had permitted the use of the cable without the barrier in these occupancies. The TG did not provide any information relative to the new prohibition. In fact, no evidence of a problem with these existing installations was even discussed. The minutes of the TG meeting clearly indicate they failed to review the fire record for these occupancies. The TG also failed to examine alternative installation criteria or even explain why the new text solved a problem. In fact, the TC failed to establish that a problem with those installations even exists.

A review of the data from United States Fire Administration (USFA) shows that there has been an overall downward trend in fire deaths in nonresidential property during the reporting period and that some fluctuation has occurred in the dollar losses resulting from those fires [USFA Fire in the United States, Tenth Edition: pg. 39]. The above data represent the time period when use of NM cable in small nonresidential buildings was permitted without the artificial limitations of the 2002 NEC. The data does not support the concern that the permitted use somehow increases the risk in those small nonresidential buildings. In fact, quite to the contrary, the fire data shows that no specific additional risk occurs in any class of occupancy from the use of NM cable. In fact, use of NM cable has been traditionally confined to small, low occupancy nonresidential buildings such as jobsite offices, small storage buildings and so on. These buildings are extremely low risk as evidenced by the data. Historically, they have performed very well. They should have not been unduly burdened by forcing a wall covering with a 15-minute thermal rating.

The requirement for a 15-minute thermal barrier crates a defacto requirement for a 1-hour assembly for use of NM cable. A review of the literature on tested assemblies for walls show that gypsum board, the common thermal barrier, applied to any wall (combustible or noncombustible) results in a 1 hour fire resistive-rated assembly. Moreover, AF&PA's publication DCA 3 shows clearly that this is the case and is supported by the aforementioned literature including the Gypsum Association Fire Resistance Directory and the Underwriters Laboratories Fire Resistance Directory.

The new requirement in 334.12.1 is equally unsubstantiated and unnecessary. It should be noted that 15-minute thermal barrier suspended ceiling systems exist, creating a conflicting requirement with 334.10. The NEC Handbook describes this as an "access" issue. However, suspended ceilings with permanently attached surfaces (gypsum board screwed to runners) are also common. This provision fails to properly distinguish between these systems and thus creates an unreasonable burden on this common form of construction. In addition, the discussion of the fire data shows that this, like the other uses of NM cable previously permitted, have not created any unacceptable risk. Neither have those installations demonstrated any particular concern for other uses of NM cable.

It is incumbent on the Panel to accept this code proposal because the fire data does not support the additional requirements that have been imposed on "other structures".

Panel Meeting Action: Reject

Panel Statement:

The Panel accepts the decision of the NFPA Standards Council, in accepting Proposal 7-137 of the NEC 2001 Report on Proposals, which was subsequently upheld by the NFPA Board of Directors.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-103 Log #2983 NEC-P07 **Final Action: Reject**
(334-10)

Submitter: Eugene Cross, Wayne's Electric Inc.

Recommendation:

Add text to 334.10 to read:
Outer sheath of NM cables shall be of different color 14/2- blue, 14/3-white, 12/2 - yellow, 12/3 - Red, 10/2 - orange, 10/3 - purple

Substantiation:

Provide easy identification for installation, inspection would be helpful for new electrical trainees and supervisors some manufacturers are now color coded. Different manufactures may use different colors. Standardized cables.

Panel Meeting Action: Reject

Panel Statement:

Outer jacket color coding is a product design feature that should not be relied on in place of jacket marking.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-101 Log #2892 NEC-P07 **Final Action: Accept in Principle in Part**
(334-10, 334.12, FPN No. 1)

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be reconsidered. The Technical Correlating Committee notes that NFPA 220 is the appropriate reference since that is the origin of Annex E. This action will be considered by the Panel as a Public Comment.

Submitter: Sam W. Francis, American Forest & Paper Association

Recommendation:

Revise text to read as follows:

FPN No. 1 Types of b~~B~~uilding construction~~s~~ and occupancy classifications are defined in NFPA 5000-2002, Building Construction and Safety Code ~~220-1999, Standard on Types of Building Construction,~~ or the applicable building code, ~~or both.~~

~~FPN No. 2: See Annex E for determination of building types [NFPA 220, Table 3-1]~~

Substantiation:

Prior to the commitment of the National Fire Protection Association to produce a building code, the only document available for reference by other NFPA documents that described building construction elements was NFPA 220. The purpose of NFPA 220 was to provide a description of types of construction that the NFPA could rely upon for reference in other documents consistently. The NEC has relied upon that document for descriptions of types of construction and structural elements. Recent events have changed these circumstances. NFPA has committed to developing a coordinated set of codes. In order to accomplish that goal, it is necessary to have a clear dedication to the building code and to support it. That dedication is necessary to ensure that all aspects of building construction are consistent throughout NFPA documents. It is equally important that use of terms or definitions of Types of Construction are consistent. If NFPA hopes to make its documents coordinated and collated, they must be consistent and they must consistently reference the building code for these issues.

The consistency and coordination between documents will never be meaningful until the preeminent codes with worldwide respect actively participate in that effort. Thus, the NEC has the opportunity to set the pace for all NFPA documents and to lead the Association into this millennium by making itself one of the most consistent and correlated documents in the NFPA library. It is imperative to the success of the NFPA Building Code and many of its companion documents to gain the acknowledgment of the NEC. failure to do so will create a significant flaw in the coordination issue.

Panel Meeting Action: Accept in Principle in Part

In the recommended wording, the panel accepts the addition of "5000-2003, Building Construction and Safety Code", and the deletion of "220-1999", Standard on Types of Building Construction", and rejects the remainder of the proposal.

Panel Statement:

See panel action and statement on Proposal 7-2.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

CANGEMI: There are other building codes that utilize the NEC as the referenced electrical code. Limiting the NEC reference to the NFPA Building Code restricts the use of the NEC within other building code organizations by limiting the construction to the NFPA 5000 types only. It is important to maintain the NEC as a neutral document committed to the furtherance of electrical safety, thus allowing it to be utilized by all building code groups.

7-98 Log #11 NEC-P07 **Final Action: Reject**
(334-10 and 334-12)

NOTE: The following proposal consists of Comment 7-43 on Proposal 7-139 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 7-139 was:

Revise text to read as follows:

336.4. Uses Permitted. Type NM, Type NMC, and Type NMS cables shall be permitted to be used in the following:

(1) One-and two-family dwellings

~~(2) Multifamily dwellings and other structures, except as prohibited in Section 336-5.~~ In any building exceeding three floors above grade, nonmetallic-sheathed cable shall be concealed within walls, floors, and ceilings where the walls, floors, and ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies. The 15-minute finish rated thermal barrier shall be permitted to be used for combustible walls, floors, and ceilings.

336.5. Uses Not Permitted.

~~(1) In any multifamily dwelling or other structure exceeding three floors above grade.~~

Submitter: C. David Mercier, Southwire Co.

Recommendation:

Revise text to read as follows:

336.4(2) Multifamily dwellings and other structures, except as prohibited in Section 336-5 In multifamily dwellings exceeding three floors above grade, Type NM cable shall be concealed within walls, floors, and ceilings where the walls, floors, and ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies. The 15-minute finish rated thermal barrier shall be permitted to be used for combustible walls, floors, and ceilings. Type NM shall be identified as meeting the following requirements when used in multifamily dwellings exceeding three floors above grade:

a. Use in cable trays.

b. Limited smoke.

c. Crush and impact of Type MC cable.

FPN: A finish rating is established for assemblies containing combustible (wood) supports. The finish rating is defined as the time at which the wood stud or wood joist reaches an average temperature rise of 121°C (250°F) or an individual temperature of 163°C (325°F) as measured on the plane of the wood nearest the fire. A finish rating is not intended to represent a rating for a membrane ceiling.

336-5(a)(1) In any ~~multifamily dwelling or other structure~~ structure, other than dwellings, exceeding three floors above grade.

Substantiation:

Additional performance requirements for Type NM cables used in multifamily dwellings above three floors above grade address concerns over removing building height restrictions. The additional requirements for NM cables address the concerns relating to flame spread, smoke and mechanical damage. These restrictions provide increased flame resistance by requiring the cable to pass the vertical-flame test that limits the flame spread in vertical cable runs, the limited smoke test which limits the amount of smoke produced in a fire, and the crush and impact test for Type MC cables to increase the cables resistance to mechanical damage. Presently, NM cable can be marked for cable tray use and limited smoke if it meets the requirements of the UL Standard. The crush and impact test for type MC cable is presently used with Type TC cable for open wiring applications.

The proposed NM construction is equivalent to currently accepted wiring methods used in buildings without height restrictions. This comment uses the same language used to recognize the use of Electrical Nonmetallic Tubing above three floors with the additional restriction of limiting installations to multifamily dwellings. Type MC cables with a nonmetallic jacket can be used in dwellings without meeting the requirements of the vertical-flame test and limited smoke test. The proposed NM cable's flame and smoke tests exceed the requirements for Type MC. The proposed NM cable's crush and impact test is the same as Type MC. The expanded use of NM should be accepted based on increased performance requirements that meet accepted wiring methods above three floors while limiting installations to concealed areas behind a 15-minute finish rated thermal barrier in multifamily dwellings.

Panel Meeting Action: Reject

Panel Statement:

This proposal is no longer applicable based the NFPA Standards Council action of accepting Proposal 7-137 of the NEC 2001 Report on Proposals.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-100 Log #2509 NEC-P07 **Final Action: Reject**
(334-10 and 334.12)

Submitter: George W. Flach, Nat'l Armored Cable Mfrs' Assn. (NACMA)

Recommendation:

Return the text of Section 334.10(1), (2), and (3) and Section 334.12(A)(1) to the text of the 1999 NEC 336-4(1) and (2) and 336-5(a)(1) as follows:

334.10 Uses Permitted.

Type NM, Type NMC, and Type NMS cables shall be permitted to be used in the following:

(1) One- and two-family dwellings.

~~(2) Multifamily dwellings permitted to be of Types III, IV, and V construction except as prohibited in 334.12.~~

(2) Multifamily dwellings and other structures, except as prohibited in Section 334.12.

~~(3) Other structures permitted to be of Types III, IV, and V construction except as prohibited in 334.12. Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least 15-minute finish rating as identified in listings of fire-rated assemblies.~~

~~FPN No. 1: Building constructions are defined in NFPA 220-1999, Standard on Types of Building Construction, or the applicable of building, or both.~~

~~FPN No. 2: See Annex E for determination of building types [NFPA 220, Table 3-1].~~

~~(4)~~ (3) Cable trays, where the cables are identified for the use.

334.12 Uses Not Permitted.

(A) Types NM, NMC, and NMS. Types NM, NMC, and NMS cables shall not be used as follows:

~~(1) As open runs in dropped or suspended ceilings in other than one-and two-family and multifamily dwellings.~~

(1) In any multifamily dwelling or other structure exceeding three floors above grade.

For the purpose of this article, the first floor of a building shall be that floor that has 50 percent or more of the exterior wall surface area level with or above finished grade. One additional level that is the first level and not designed for human habitation and used only for vehicle parking, storage, or similar use shall be permitted.

Substantiation:

The revisions made to 334.10 and 12 of the 2002 NEC were made based on a proposal that was rejected by the CMP-7 Task Group that developed the text. It was also rejected by CMP-7, it was rejected by the NFPA members at the Annual meeting, and finally it was rejected by the Technical Correlating Committee. The proposal was however accepted by the NFPA Standards Council. The Standards Council should not have unilaterally accepted the proposal because of the following reasons.

1. The Standards Council stated that it made its Decision to overturn the Task Group, CMP-7, the NFPA Membership, and the TCC on technical grounds, however, the Council members are not appointed due to having any expertise related to this issue. The NFPA regulations, Section 3-2.4.1, contain the requirements for Applications for Membership. They include the following Sections that are pertinent to this discussion:

a) "Evidence of knowledge and competence in the work of the TC and/or TCC." Clearly, there is no evidence the Council membership had the technical competence to consider the issues related to the safe use of Type NM cable.

b) "Assurance of ability to participate actively, including responding to correspondence and attendance at meetings." To our knowledge, no Council member attended any of the CMP-7 meetings nor did they attend any of the CMP-7 Task Group meetings.

c) "Relationship of applicant to the Scope of the TC and/or TCC." Here, the only member of the Council who would qualify under this condition of membership on CMP-7 was asked to rescue himself. This left Council members with no demonstrated expertise to make a very technical decision.

2. The Council is not balanced by interest groups as required by the Regulations for Technical Committees.

3. The Council's deliberations are permitted to be in executive session, out of sight and sound of those who have an interest in the issue before the Council. While this is clearly permitted by the Regulations, we feel such a provision is faulty and can lead to decisions that are improperly conceived and concluded.

4. The Council showed a bias in favor of expanding the use on Type NM Cable (NM) in its Aug. 17, 1998 decision D#98-22 on Council Agenda Item SC#98-60(b/c/d). As a result, the Council's July, 2001 decision to accept the proposal cannot meet the test for being "fair, unbiased, and impartial" as required in 3-5 of the Code for the Conduct of Participants in the NFPA Codes and Standards Development Process.

The Council directed in its 1998 decision that the new Chair of CMP-7 appoint a task group to include a representative of the National Multi-Housing Council and that the task group do an in-depth review of the Proposals at issue with consideration to whether any one or a combination or modification of these Proposals could be approved and the basis for such approval. As a result of the bias shown in its D#98-22 decision, the Council could not consider the issues before it in July, 2001 in an impartial manner and should have rescued itself when asked to hear the appeal on the expanded use of Type NM cable.

5. The Guidelines Applicable to Standards Council Members requires that "Standards Council members who have previously expressed a position on a matter that is the subject of an appeal to the Council in such a manner that his or her views are, or would appear to be, fixed and not amenable for open consideration of the issue, then the member should, at the outset of any hearing or discussion, state his or her intention to step down from the Council for the purposes of that heating or discussion." To comply with this Guideline, the entire Council should have rescued itself as it had previously expressed a bias in favor of the expanded use of Type NM cable.

6. The Council overstepped its authority granted in 2.1 and 2.2 of the Regulations. These sections of the Regulations give the Council the authority to appoint Technical Committees (TCs) and Technical Correlating Committees (TCCs) to do the work of producing and revising the various Codes and Standards in the NFPA library. Nothing in the Regulations gives the Council the authority to take upon itself the privilege or responsibility for making decisions on technical or safety issues where those issues have been considered by a TC or TCC. Technical Committee members are appointed to the TC based upon their meeting the test for having experience and technical competency in the scope of the TC. Council members are not required to have the same competency in specific issues as TC members are and thus should not usurp the authority and responsibility assigned by the Council to TCs for making safety and technical decisions on issues before them.

7. The Council chose to ignore the fact that consensus, as defined in the Regulations, had been reached as proposals and comments for the expanded use of Type NM cable had failed to be accepted at every step in the process outlined in the Regulations. "Consensus" as defined in 3-3.6.1 of the Regulations was reached in the issue of the expanded use of Type NM cable by CMP-7, its Task Group, the NEC TCC and by the membership at the NFPA Annual Meeting. Note that the definition does not require unanimity but much more than a simple majority. Proposals and comments on the expanded use of Type NM cable were soundly defeated at every step of the NFPA

process. In its decision, the Council chose to usurp the authority to make a decision contrary to that of the consensus process outlined in the Regulations. Such action belittles the credibility of the TCs and TCCs appointed by the Council to make these decisions. Such action by the Council begs the question, "Why have TCs or TCCs at all? Why not have the Council make all the decisions on proposals and comments?"

Panel Meeting Action: Reject

Panel Statement:

The Panel accepts the decision of the NFPA Standards Council, in accepting Proposal 7-137 of the NEC 2001 Report on Proposals, which was subsequently upheld by the NFPA Board of Directors.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

SCHUMACHER: I agree with the submitter, the Standards Council is not a technical committee, and had no business making a technical decision. I have served on Code-Making Panel 7, and the Task Group on NM Cable and have studied all of the data on NM cable, and have reviewed all of the proposals that have been submitted, and while I find it to be safe when properly installed in buildings of wood frame construction, the data shows that there is no doubt when it is installed in buildings of other than wood frame construction. It is my understanding that type NM Cable has never been tested pulled through metal studs, like it was tested through wood studs. I have also seen first hand the damage that can be done to NM cable during installation in metal framing members, and I have seen the results of that damage.

7-104 Log #3072 NEC-P07 **Final Action: Reject**
(334-10 Exception (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation:

Add an exception after (3) as follows:
Exception to (2) and (3): Type NM, Type NMC, and Type NMS cables shall be permitted to be used in one and two-family dwellings, multi-family dwellings and other structures of Type I and II construction, provided that where such dwellings or structures exceed three floors above grade Type NM, MNC and Type NMS cables shall not be permitted to leave the floor or dwelling unit from which the cables originated. This exception shall only apply where the building is protected by an approved fire sprinkler system(s) installed on all floors as a complete system, or where the Type NM cable is concealed behind a thermal barrier as described in 362.10(2) or 362.10(5).

Substantiation:

The rules of the appointing authority under which Massachusetts Electrical Code (MEC) Advisory Committee operate preclude the submittal of proposals that are not part of the adopted text of the MEC. This proposal substantively exceeds the present MEC requirements in that it includes a fire finish requirement. Therefore, this proposal, although based on the MEC, is the sole responsibility of the submitter. No relationship between this proposal and the MEC Advisory Committee should be inferred.

The submitter takes this opportunity to commend the actions of the NFPA Standards Council in this article in the 2002 NEC cycle. Those actions, although drastic, were nothing short of brilliant. The Council clearly understood that if it didn't act, our industry could have lost control of the NEC to building officials. The prior NEC limitations on this product created the appearance that the process was driven by special interests within our industry, since untrained persons could so readily identify the financial benefits to most of the participating interests on the panel. Indeed, the MEC Advisory Committee was able to deflect a serious attempt by the Archdiocese of Boston to amend the state electrical code in the interest of lowering housing costs. The existence of the Massachusetts amendment, however, rapidly deflated that attempt in this state, since the goals had already been met. The Standards Council apparently understood that the same calculation could have threatened the credibility of the NFPA Regulations Governing Committee Projects, were no action taken at the time. Code-Making Panel 7 members may recall the submitter's presentation at the 2002 ROC meeting in Phoenix, to the effect that if the NEC Committee did not provide meaningful movement on this issue, then the matter would be removed from its hands, perhaps by state legislatures. Although the final outcome probably is difficult for Code-Making Panel 7 to swallow, by containing the process within NFPA the Standards Council action likely saved this industry from itself, and went a long way towards keeping control of the NEC in the hands of our industry.

This proposal will help complete the Council's initiative. The continued exclusion of Type NM cable from Type I and II construction is untenable. This construction presents the lowest risk of fire transmission, and the building codes recognize combustible plumbing and wiring elements within the walls. This simple fact rebuts the comment in the voting on 2002 Proposal 7-151. Long ago Code-Making Panel 8 learned to discard the argument that introducing a combustible product into the wall had a meaningful impact on safety, since the combustion of room furnishings would kill anyone still in the area long before the temperatures inside a partition degraded the wiring. This proposal incorporates the finish restriction now applicable to ENT for that reason. If PVC raceways and nonmetallic jacketed steel Type MC cable can run inside Type I and II partitions (and presently RNC and jacketed Type MC cable need not even be concealed), surely Type NM cable can as well.

As noted in the proposal from the MEC Advisory Committee, the present Code wording, although vastly improved from the 1999 cycle, still precludes the use of Type NM cable in the buildings least likely to burn. This proposal contains an additional restriction to ensure that the cables aren't a factor in transmission of fire from floor to floor. That restriction also reduces the likelihood of cable damage from dragging over rough edges of concrete, since it won't be pulled into place from a lower floor. As Massachusetts approaches its thirty-third year of allowance of these uses, the submitter hopes Code-Making Panel 7 will reconsider its steadfast opposition to expanded use of this wiring method.

Panel Meeting Action: Reject

Panel Statement:

The panel does not have any knowledge as to the substantiation used by the Commonwealth of Massachusetts in permitting Type NM cable to be installed in Types I and II structures.

The Panel accepts the decision of the NFPA Standards Council, in accepting Proposal 7-137 of the NEC 2001 Report on Proposals, which was subsequently upheld by the NFPA Board of Directors.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

SCHUMACHER: The use of Type NM Cable above 3 floors has not been proven safe, while the submitter draws a parallel with the Massachusetts Electrical code, he fails to mention that data submitted to the Task Group on NM cable shows a greater percentage of apartment fires in Massachusetts than in any other state.

7-105 Log #3168 NEC-P07 **Final Action: Reject**
(334-10 Exception (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass Electrical Code Adv. Committee

Recommendation:

Add an exception after (3) as follows:
Exception to (2) and (3): Type NM, Type NMC, and Type NMS cables shall be permitted to be used in one and two-family dwellings, multi-family dwellings and other structures of Type I and II construction, provided that where such dwellings or structures exceed three floors above grade Type NM, NMC and Type NMS cables shall not be permitted to leave the floor or dwelling unit from which the cables originated.

Substantiation:

The continued exclusion of Type NM cable from Type I and II construction is untenable. This construction presents the lowest risk of fire transmission, and the building codes recognize combustible plumbing and wiring elements within the walls. This simple fact rebuts the comment in the voting on 2002 Proposal 7-151. Long ago CMP 8 learned to discard the argument that introducing a combustible product into the wall had a meaningful impact on safety, since the combustion of room furnishings would kill anyone still in the area long before the temperatures inside a partition degraded the wiring.
The present Code wording, although vastly improved from the 1999 cycle, still leads to the following result: The buildings most able to safely contain a nonmetallic wiring system will be unlikely to be allowed to use it. This proposal contains an additional restriction to ensure that the cables aren't a factor in transmission of fire from floor to floor. That restriction also reduces the likelihood of cable damage from dragging over rough edges of concrete, since it won't be pulled into place from a lower floor. As Massachusetts approaches its thirty-third year of allowance of these uses, we are unaware of any loss experience in our state related to this permission.

Panel Meeting Action: Reject

Panel Statement:

The panel does not have any knowledge as to the substantiation used by the Commonwealth of Massachusetts in permitting Type NM cable to be installed in Types I and II structures.
The Panel accepts the decision of the NFPA Standards Council, in accepting Proposal 7-137 of the NEC 2001 Report on Proposals, which was subsequently upheld by the NFPA Board of Directors.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

SCHUMACHER: The code-making panel has always recognized the fact that Type NM Cable is not as safe as other wiring methods, and data submitted during this cycle with Proposal 7-150a (CP 700) clearly shows that the number of fires that start because of installed wiring far exceeds all other causes of fires started by the electrical distribution system.

7-106 Log #3318 NEC-P07 **Final Action: Reject**
(334-10(3) , 334.12(A)(1))

Submitter: Lawrence G. Perry, BOMA Intl.

Recommendation:

Revise 334.10 as follows:
334.10 Uses Permitted. Type NM, Type NMC, and Type NMS cables shall be permitted to be used in the following:
(1) One- and two-family dwellings.
(2) Multifamily dwellings permitted to be of Types III, IV and V construction except as prohibited in 334.12.
(3) Other structures permitted to be of Types III, IV, and V construction except as prohibited in 334.12. ~~Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.~~
(4) Cable trays, where the cables are identified for the use.
Also, revise 334.12 as follows:
334.12 Uses Not Permitted.
(A) Types NM, NMC, and NMS. Types NM, NMC, and NMS cables shall not be used as follows:
~~(1) As open runs in dropped or suspended ceilings in other than one- and two-family and multifamily dwellings.~~
Renumber items 2-10 without any changes.

Substantiation:

As part of a revision to the code to permit the expanded use of NM cable, for which extensive substantiation was provided, new unsubstantiated restrictions were added for uses that have previously been permitted. This proposal seeks to remove these unjustified restrictions.

There is no indication that the unconcealed use of NM cable presents any unique hazard condition that warrants a change to a long-standing provision in the code. It is unclear how a revision to allow the use of NM cable in taller buildings has somehow created a new hazard in a building where unconcealed NM cable was previously permitted.

The restriction in 334.12 appears to be based on assumption that the NEC will not be complied with. If NM cable is installed in accessible spaces, the code already provides adequate requirements for its protection. The installation of open-runs of NM cable above a ceiling presents no hazard. This restriction appears to prohibit the enclosure that 334.10 requires; one of the current options is to conceal the NM cable with a ceiling. Since neither "dropped ceiling" nor "suspended ceiling" are defined in the NEC or NFPA 5000, this appears to prohibit NM cable above even drywall assemblies, if the assembly is "dropped" or "suspended" from the structure.

Upon acceptance of this proposal, items (2) and (3) in 334.10 could be editorially combined into a single item, addressing all "other structures" than one- and two-family dwellings (which are in item 1).

No data was provided to justify the introduction of these restrictions on the use of NM cable in "other structures". These restrictions should be removed.

Panel Meeting Action: Reject

Panel Statement:

The Panel accepts the decision of the NFPA Standards Council, in accepting Proposal 7-137 of the NEC 2001 Report on Proposals, which was subsequently upheld by the NFPA Board of Directors.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-107 Log #1802 NEC-P07 **Final Action: Reject**
(334-10(2))

Submitter: William A. Wolfe, Steel Tube Institute of North America

Recommendation:

Change "Multi-family dwellings" to "Multifamily units" as follows:
(2) Multifamily dwellings units permitted to be of Types III, IV, and V construction except as prohibited in 334.12.

Substantiation:

It was not anticipated that the Standards Council would override technical decisions reached by the NM Cable Task Group, Code Making Panel 7, and the NFPA membership. When the proponent submitted a proposal that was purported to be a Task Group recommendation it was well known that the Task Group had problems with the text beyond the three-story expansion issue. That proposal was not accepted by the Task Group, and a similar proposal was addressed at the second round TG meetings and also rejected. The issue of Multi-family Dwelling vs. Multi-family Dwelling Unit was discussed by the TG from the following persepctive: because the NEC definition of Multi-family Dwelling is "ANY building containing three or more dwelling units," it was noted that that technically could be interpreted to mean if three or more dwelling units are in a multi-purpose building it can be considered a multi-family dwelling and wired accordingly. Therefore, Dwelling Unit is the term need in order to properly enforce the Code (so that thermal barriers are used where required in Other Structures.)

This becomes even more important in order to comply with one of the issues that was used as support for expanding the use of NM cable. It was submitted that Massachusetts permits NM cable beyond three stories, but it is important to note that MA requires that the NM not leave the unit in which it originates. Had the TG actually prepared a proposal, that requirement would undoubtedly (from the discussions) have been a part of it. This would not prevent a multi-story UNIT from using NM, but would provide better protection for residential occupants from a neighbor's problems. Common egress areas and common area rooms should not be wired in NM cable for all the reasons presented to (and accepted by) Code Making Panel 7 year after year.

Panel Meeting Action: Reject

Panel Statement:

The Panel accepts the decision of the NFPA Standards Council, in accepting Proposal 7-137 of the NEC 2001 Report on Proposals, which was subsequently upheld by the NFPA Board of Directors.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

SCHUMACHER: I agree with the submitter, "dwelling unit" makes a lot more sense that just "dwelling", and helps clear up a lot of grey areas when defining buildings.

7-108 Log #2127 NEC-P07 **Final Action: Reject**
(334-10(2)(3) & (4))

Submitter: Leonard L. Johnson, Dept. of Insp, Licenses & Permits, Howard Cnty, MD

Recommendation:

Revise as follows:
(2) Multifamily dwellings ~~permitted to be of Types III, IV and V construction~~ and other structures that do not exceed a total of 5 floors above grade except as prohibited in 334.12.
(3) Delete current text entirely. Renumber what is now (4) as (3).

Substantiation:

There has been no substantiation submitted to justify that the use of NM cable be dependent on the construction type of the building. There has been a lot of conjecture, questions, opinions and statements, but no facts. This proposal would allow NM cable in a building no matter what the construction class of the building. The proposal would limit the use of NM cable to 5 story buildings, the allowed height of buildings of Type III, IV or V construction. The use of NM cable would not be dependent on a building code, that may or may not change, and would stay within the guidelines of the NEC.

Panel Meeting Action: Reject

Panel Statement:

The panel accepts the decision of the NFPA Standards Council to permit Type NM cable in Types III, IV, and V construction. The panel also agrees that NM cable in other structures should be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

NICKSON: The panel statement needs clarification that Type NM cable is allowed in buildings permitted to be of Types III, IV, and V construction.

The first sentence of the substantiation should be corrected to read:
The panel accepts the decision of the NFPA Standards Council to permit Type NM cable in buildings permitted to be of Types III, IV, and V construction.

7-109 Log #1803 NEC-P07 **Final Action: Accept in Principle**
(334-10(4))

Submitter: William A. Wolfe, Steel Tube Institute of North America

Recommendation:

Revise to read:
(4) Cable trays~~, where the cables are identified for the use~~ in structures permitted in (1), (2), and (3) where the cables are identified as Type TC.

Substantiation:

This revised text is needed for clarification. Merely stating "in cable trays" could be misinterpreted to permit NM Cable in any building without restriction as long as it is installed in cable tray. It is more complete Code text.

Panel Meeting Action: Accept in Principle

In the recommendation, change the wording to read as follows:
"(4) Cable trays in structures permitted to be Types III, IV, or V where the cables are identified for the use."

Panel Statement:

It is now clear that all restrictions apply to installations involving NM cable installed in cable tray.
The panel understands that the action on this proposal will be superceded by the action taken on Proposals 7-99 and 7-115.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-110 Log #2995 NEC-P07 **Final Action: Reject**
(334-10(5) (New))

Submitter: Don Ganiere Ottawa, IL

Recommendation:

Add new (5): "Installed in raceways sized according to Note 9 to Table 1 in Chapter 9"

Substantiation:

It is common practice to install NM cable within raceways for portions of the cable run. The raceway articles say that cables can only be installed in raceways in accordance with the appropriate cable article. There is no permission in Article 334 to permit the installation of NM cable in a raceway.

Panel Meeting Action: Reject

Panel Statement:

This is unnecessay, since the action on Proposal 7-115 does not prohibit this type of installation.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-111 Log #263 NEC-P07 **Final Action: Accept**
(334-10(A))

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Accept

Panel Statement:

See panel action on Proposal 7-99.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-112 Log #264 NEC-P07 (334-10(B)) **Final Action: Accept**

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Accept

Panel Statement:

See panel action on Proposal 7-99.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-113 Log #265 NEC-P07 (334-10(C)) **Final Action: Accept**

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Accept

Panel Statement:

See panel action on Proposal 7-99.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-114 Log #514 NEC-P07 (334-10(C)(3)) **Final Action: Accept**

Submitter: James M. Daly, General Cable

Recommendation:

Delete 334.10(C)(3).

Substantiation:

There is nothing in Article 780 that permits or prohibits the use of NMS cable.
90.3 states that Chapters 1, 2, 3, and 4 apply generally; Chapters 5, 6 and 7 apply to special occupancies, special equipment, or other special conditions. These latter chapters supplement or modify the general rules. Chapters 1 through 4 apply except as amended by Chapters 5, 6, and 7 for the particular conditions.

Panel Meeting Action: Accept

Panel Statement:

See panel action on Proposal 7-99.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-115 Log #2020 NEC-P07 (334-12) **Final Action: Accept in Principle in Part**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Change the existing text to the following:

334.12 Uses Not Permitted. Type NM, NMC, and NMS cables shall not be used under the following conditions or in the following locations:

(1) For multifamily dwellings of other than Types III, IV, and V construction.

(2) For non-dwelling structures of other than Types III, IV, and V construction, and where the cables are not concealed within walls, floors, and ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.

FPN No. 1: Building constructions are defined in NFPA 220-1999, *Standard on Type of Building Construction*, or the applicable building code, or both.

FPN No. 2: See Annex E for determination of building types [NFPA 220, Table 3.11.

(3) For cable tray installations unless the cable is identified for the use.

(4) For open run installations in dropped or suspended ceilings in other than one- and two -family and multifamily dwellings.

(5) For installation as service entrance-cable.

(6) For use in commercial garages having hazardous (classified) locations, except in accordance with 511.3(B).

(7) For use in theaters and similar locations, except where permitted in 518.4.

(8) For use in motion picture studios.

(9) For use in storage battery rooms.

(10) For use in hoistways, or on elevators or escalators.

(11) For installations embedded in poured cement, concrete, or aggregate.

(12) For use in hazardous (classified) locations, except where permitted in the following:

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept in Principle in Part

Revise the wording in the Proposal to read as follows:

"334.12 Uses Not Permitted.

(A) Types NM, NMC, and NMS. Types NM, NMC, and NMS cables shall not be permitted under the following conditions or in the following locations:

(1) In Type I or II construction unless permitted to be Types III, IV, or V construction.

(2) In non-dwelling construction unless the cables are concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.

FPN No. 1: Building constructions are defined in NFPA 220-1999, Standard on Type of Building Construction, or the applicable building code, or both.

FPN No. 2: See Annex E for determination of building types [NFPA 220, Table E-1]

(3) For installation in cable tray unless the cable is identified for the use.

(4) For open run installations in dropped or suspended ceilings in other than one- and two-family and multifamily dwellings.

(5) For installation as service-entrance cable.

(6) For use in commercial garages having hazardous (classified) locations as defined in 511.3.

(7) For use in theaters and similar locations, except where permitted in 518.4(B).

(8) For use in motion picture studios.

(8) For use in motion picture studios.
(9) For use in storage battery rooms.
(10) For use in hoistways or on elevators or escalators.
(11) For installations where the cable is embedded in poured cement, concrete, or aggregate.
(12) For use in hazardous (classified) locations, except where permitted by the following:
a. 501.4(B), Exception
b. 502.4(B), Exception No. 1
c. 504.20
(B) Types NM and NMS. Types NM and NMS cables shall not be used under the following conditions or in the following locations:
(1) Where exposed to corrosive fumes or vapors.
(2) Where embedded in masonry, concrete, adobe, fill, or plaster.
(3) In a shallow chase in masonry, concrete, or adobe and covered with plaster, adobe, or similar finish.
(4) Where exposed or subject to excessive moisture or dampness."

Panel Statement:

Revisions were made to improve clarity and make the text more positive.
(1) The revised text makes it clear that NM cable cannot be installed under any conditions in any construction that is required to be Type I or II construction.
The change to "or" in (2) is more accurate.
The "-" is in the wrong location in (5).
(6) Change is consistent with wording in 2002 Code; no substantiation to change.
(8) Make the reference more specific. NM cable is only mentioned in 518.4(B).(12).
The Panel assumes that the submitter intended to include the balance of the text in 334.12(9) and 334.12(10) in the 2002 Code. 334.12(10) in the 2002 Code should have been (B) to comply with the NEC Style Manual. 1.7.5 of the NFPA Style Manual stipulates that all subdivisions shall contain at least two subdivisions so an (A) without a (B) is not permitted. Also 334.12(10) had a title whereas none of the other list items had a title.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-12.
SCHUMACHER: This should be rejected, see my Explanation of Negative Vote on Proposal 7-99.
STEWART: See my Explanation of Negative for Proposal 7-8.

Comment on Affirmative:

NICKSON: The panel statement needs clarification that Type NM cable is allowed in buildings permitted to be of Types III, IV, and V construction. The change approved by the Standards Council will permit NM cable in Type I and Type II buildings if under the code the building could have been construction as Type III, IV, or V construction.
Item (1) should be corrected to read:
(1) The revised text makes it clear that NM cable is only allowed in buildings permitted to be of Types III, IV, and V construction ~~cannot be installed under any conditions in any construction that is required to be Type I or II construction.~~

7-116 Log #2119 NEC-P07 **Final Action: Reject**
(334-12)

Submitter: Todd Bennett, All County Electrical Company

Recommendation:

Revise as follows:
334.12 Uses Not Permitted.
(2) On systems with over 150 volts to ground, or 300 volts phase to phase.
~~(2)~~(3) As service - entrance cable.
Renumber accordingly.

Substantiation:

This cable is not safe to use on systems that are 277/480 volts. In my years as an electric service manager, I have seen numerous fires that were started when Type NM Cable that was nicked, or stapled to hard. The cable broke down and the higher voltage caused an arc that caused the wood framing to ignite.

Panel Meeting Action: Reject

Panel Statement:

Inadequate technical substantiation has been provided to support the reduction in voltage.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

BROWN: Type NM cable is a viable wiring system when properly installed, even the most efficient installer will on occasion overdrive a staple to the point of jeopardizing the integrity of the cable. Limiting the voltage to 150 volts to ground and/or 300 volts phase to phase is a common sense issue that greatly contributes to "good code" that protects life and property.
SCHUMACHER: Type NM Cable is mainly a residential cable, and these higher voltages are not present in those types of structures anyway. The use of NM cable on 277/480 Volt systems increases the potential for fire to start from arcing.

7-117 Log #1804 NEC-P07 **Final Action: Accept in Principle**
(334-12(1) (New))

Submitter: William A. Wolfe, Steel Tube Institute of North America

Recommendation:

Add the following new (1) to 334.12 and renumber the existing text to follow in numerical order.
(1) In any dwelling or structure not specifically permitted in 334.10(1), (2), and (3).

Substantiation:

Article 334 is the only NEC article which references specific types of construction, based on the applicable building code. In the July/August issue of the ICC Codes and Forum, the following statement appeared in an article about the NM code change in the 2002 NEC. "It is noteworthy that the NEC text states where Type NM cable is permitted to be used but does not state that Type NM cable is prohibited in buildings other than those specified in Section 334.10." The addition of the proposed text would clarify exactly where NM cable can and cannot be used.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 7-115.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-118 Log #2424 NEC-P07 **Final Action: Reject**
(334-12(1))

Submitter: Thomas J. Garvey, State of Wisconsin

Recommendation:

Replace the existing text with:
"As open runs through open web steel joists."

Substantiation:

The current text is vague, difficult to interpret and enforce. The intent of the rule is to prohibit Type NM cables from being pulled through open web steel joists. The cables are easily damaged by the sharp unfinished edges. The cables also have a tendency to get wedged into the triangular space between the cross braces and the lower chord of the joist. This may damage both the sheath and the insulated conductors. I have personally observed such damage. There are no protective bushings or grommets that can be used with this type of structural member to protect the cables as they are being pulled through.

The existance of a suspended or dropped ceiling has no impact on cable damage. The cables may be visable from the floor but the damage can usually only be observed from a ladder or lift.This practice should be prohibited if the joists would be used in one-, two-, or multi-family dwellings.

Panel Meeting Action: Reject

Panel Statement:

The present text of 334.15(B) already covers requirements for protection from physical damage.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

SCHUMACHER: The Task Group on NM Cable did considerable work in this area, and determined that in metal joists, there was severe potential for damage to Type NM cable as it was pulled across the rough edges of metal bar joists.

7-119 Log #3094 NEC-P07 **Final Action: Reject**
(334-12(1))

Submitter: Thomas J. Garvey, State of Wisconsin

Recommendation:

Replace existing text with:
"As open runs through open-web metal joists."

Substantiation:

The current text is vague and hence, difficult to enforce. The intent of the rule is to prohibit Type NM cables from damage that occurs when the cable is pulled through the webs of open-web steel joists. The cables are easily damaged by sharp, unfinished metal edges. The existence of a drop ceiling is irrelevant.

Panel Meeting Action: Reject

Panel Statement:

The present text of 334.15(B) already covers requirements for protection from physical damage.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

SCHUMACHER: See my Explanation of Negative Vote on Proposal 7-118.

7-120 Log #3170 NEC-P07 **Final Action: Reject**
(334-12(1))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass Electrical Code Adv. Committee

Recommendation:

Revise 334.12(1) to read as follows:
In dropped or suspended ceilings in other than one- and two-family and multifamily dwellings, unless run so as to closely follow the surface of framing members, running boards, or the equivalent, or unless connected to luminaires (lighting fixtures) in accordance with 334.30(B)(2).

Substantiation:

The proposal clarifies the intended application of additional support for NM cable where run in nonresidential hung ceilings. The provision, as proposed to be amended, will avoid the erroneous interpretation that prevents Type NM cable from being run on open running boards above such a ceiling. The NEC rule, as framed by the CMP-7 task group, is aimed at common commercial wiring practices that commonly leave substantial cable (and other system) weight laying across wiring methods secured to bar joists. A running board is sufficient protection in this case.

Panel Meeting Action: Reject

Panel Statement:

The Panel accepts the decision of the NFPA Standards Council, in accepting Proposal 7-137 of the NEC 2001 Report on Proposals, which was subsequently upheld by the NFPA Board of Directors.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-121 Log #181 NEC-P07 **Final Action: Reject**
(334-12(10)(e) (New))

Submitter: Lloyd L. Gadbois, Village of Bradley / Rep. IBEW Local 176

Recommendation:

Add new text as follows:
334.12 Uses Not Permitted.
(10)e. Where installed on the surface of roof rafters or the trusses which support the sheeting for the roof and roofing and where cables are exposed to the extremely high temperatures which are developed in attic spaces.

Substantiation:

Attic temperatures often rise to above 190 degrees. Cables run on the rafters and above the insulation may suffer ampacity losses. Keeping "home runs" at the level of the joists is cooler and safer.

Panel Meeting Action: Reject

Panel Statement:

The correction factors to Tables 310.16 and 310.18 address the submitter's concern.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-122 Log #266 NEC-P07 **Final Action: Accept**
(334-12(A))

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the first sentence.
Change "(10) Types NM and NMS. Types NM and NMS shall not be used as follows:" to "(B) Types NM and NMS. Types NM and NMS shall not be used:" The other text in the Section remains unchanged.

Substantiation:

These changes will improve clarity and permit each of the remaining 9 list items in (A) and the 4 list items in (B) to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.
The first 9 list items apply to NM, NMC, and NMS, while list item 10 only applies to NM and NMS.
(10) is the only list item that contains a title.
Changing (10) to (B) will also comply with 1.7.5 of the NFPA Manual of Style that states "All subdivisions shall contain at least two subdivisions." The present text only contains one subdivision.

Panel Meeting Action: Accept

Panel Statement:

See panel action on Proposal 7-115.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-123 Log #107 NEC-P07 **Final Action: Accept**
(334-12(A)(1))

Submitter: James M. Daly, General Cable

Recommendation:

Change "As open runs in dropped..." to "Exposed in dropped...".

Substantiation:

This is one of a series of proposals to provide consistency throughout the code in the use of the terms "exposed", "open wiring", and "open runs" as applied to wiring methods.

"Exposed" is used 306 times throughout the code, "open runs" is used 7 times, and "open wiring" is used 29 times but only 10 of those instances do not refer to "open wiring on insulators".

Exposed is defined in Article 100 as shown below.

"Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated or insulated."

"Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access."

Open wiring on insulators is defined in 398.2 as "An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings."

"Open runs" is not defined in the code.

This series of proposals will limit the term "open wiring" to open wiring on insulators (Article 398) and have the term "exposed" apply to "open runs" and open wiring not on insulators.

Wire and cable that must be continuously supported and protected will be specifically addressed in the applicable section.

Panel Meeting Action: Accept

Panel Statement:

The panel understands that this action will revise 334.12(A)(4) of Proposal 7-115 to read:

"Exposed in dropped or suspended ceilings...".

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-124 Log #2128 NEC-P07 **Final Action: Reject**
(334-12(A)(1))

Submitter: Leonard L. Johnson, Dept. of Insp, Licenses & Permits, Howard Cnty, MD

Recommendation:

Deleted text:

(1) ~~As open runs in dropped or suspended ceilings in other than one and two family and multifamily dwellings.~~

Renumber existing (2) through (10) as new numbers (1) through (9).

Substantiation:

There was no substantiation given to restrict the use of NM cable in dropped or suspended ceilings in other types of occupancies.

Panel Meeting Action: Reject

Panel Statement:

The Panel accepts the decision of the NFPA Standards Council, in accepting Proposal 7-137 of the NEC 2001 Report on Proposals, which was subsequently upheld by the NFPA Board of Directors.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-125 Log #2409 NEC-P07 **Final Action: Reject**
(334-12(A)(1))

Submitter: Wayne Sargent, City of Salem, Oregon

Recommendation:

(A) Types NM, NMC, and NMS. Types NM, NMC, and NMS cables shall not be used as follows: (1) As accessible, unprotected runs in dropped or suspended ceilings in other than one- and two-family and multifamily dwellings.

Substantiation:

The adjective "open" is not clearly understood. When electricians refer to this section, as an electrical inspector, I am asked to interpret or define what open wiring means in this context.
Merriam-Webster's Collegiate® Dictionary defines "open" as "having no enclosing or confining barrier, accessible on all or nearly all sides." There are 17 other possible definitions for "open" including, "being an incomplete electrical circuit."
To avoid arguments and potential rewiring costs, it would be helpful to specify what is meant by "open runs" above suspended ceilings by replacing "open" with two descriptive words, "accessible" and "unprotected." This assumes the intent is that which is described in the NFPA 2002 NEC Handbook under 334.12(A)(1), and so that wording was used for this proposal.
For example, a converse interpretation of "open runs" could be that it is acceptable on commercial buildings of any size to run NM above those ceilings if enclosed or hidden. This could be in a channel, joist bay, or other elongated space, reasoning that it is not "open" if hidden above a framing member, regardless if it were accessible or subject to damage. However, if "open runs" is replaced with "accessible, unprotected runs," this argument is invalid.

Panel Meeting Action: Reject

Panel Statement:

The panel contends that the action taken on Proposal 7-123 provides more clarity by using a defined term.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-126 Log #2811 NEC-P07 **Final Action: Reject**
(334-12(A)(1))

Submitter: Henry A. Jenkins, Wake County

Recommendation:

Delete entirely item (1)
~~As open runs in dropped or suspended ceilings in other than one and two family dwellings.~~

Substantiation:

There was no technical or safety data presented during the 2002 Code cycle to substantiate the deletion of allowing the use of NM, NMC and NMS cable types above a ceiling. This installation must comply with other applicable sections of Article 334, i.e., securing and supporting, ampacity.

Panel Meeting Action: Reject

Panel Statement:

The Panel accepts the decision of the NFPA Standards Council, in accepting Proposal 7-137 of the NEC 2001 Report on Proposals, which was subsequently upheld by the NFPA Board of Directors.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-127 Log #3358 NEC-P07 **Final Action: Reject**
(334-12(A)(1))

Submitter: Edward W. Langschwager, Langschwager Electric Corp.

Recommendation:

Delete text as follows:
~~(1) As open runs in dropped or suspended ceilings in other than one- and two-family and multifamily dwellings.~~

Substantiation:

There is no reason why this wiring method cannot be installed as permitted in 334.10(3) with a restriction equal to a 15 minute fire rating. And, furthermore, if it can be used in one and two family and multifamily dwellings, then why not in any structure. Committee Reports did not yield to toxicity concerns in the comment period what is the problem?

Panel Meeting Action: Reject

Panel Statement:

The Panel accepts the decision of the NFPA Standards Council, in accepting Proposal 7-137 of the NEC 2001 Report on Proposals, which was subsequently upheld by the NFPA Board of Directors.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-128 Log #1815 NEC-P07 **Final Action: Reject**
(334-12(A)(1) Exception (New))

Submitter: Gilbert L. Thompson, MEIA Codes and Standards

Recommendation:

Add an Exception to read as follows:
Exception: Where a fire sprinkler system(s) is installed in accordance with NFPA 13-1999, Standard for the Installation of Sprinkler Systems, on all floors, nonmetallic-sheathed cable is permitted to be used in these type ceilings.

Substantiation:

Most building codes are now requiring more and more commercial buildings to have sprinklers installed (depending upon the type of construction). If an exception is allowed for ENT in Section 362.10(5), then the same exception should be extended to nonmetallic cable.
The Code Making Panel made changes to the 2002 code in this section because of studies done by an Ad Hoc Committee, so it would seem that safety of personnel and the fire protection of the building would be provided when a certified sprinkler system is installed.

Panel Meeting Action: Reject

Panel Statement:

Sprinklers would be installed at the suspended ceiling level that would be below the NM cable.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-130 Log #706 NEC-P07 **Final Action: Accept**
(334-12(A)(9))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise:
(9) In hazardous (classified) locations except where permitted in:
a. 501.4(B)(3) ~~Exception~~
b. 502.4(B)(3) ~~Exception No. 1~~
c. 504.20

Substantiation:

Edit. Former exceptions were incorporated into text.

Panel Meeting Action: Accept

Panel Statement:

The panel understands that the action taken on this proposal will modify 334.12(A)(12) in Proposal 7-115.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-129 Log #311 NEC-P07 **Final Action: Accept**
(334-12(A)(9) a. and b.)

Submitter: Richard J. Schmidt, Eastern Power & Controls, Inc.

Recommendation:

Revise text to read as follows:
334.12(A)(9)
a. ~~501.4(B), Exception~~ 501.4(B)(3).
b. ~~502.4(B), Exception No. 1~~ 502.4(B)(3).

Substantiation:

Problem that will be resolved — The correct references will be made.

Panel Meeting Action: Accept

Panel Statement:

The panel understands that the action taken on this proposal will modify 334.12(A)(12) in Proposal 7-115.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-131 Log #1827 NEC-P07 **Final Action: Reject**
(334-15(A) Exception (New))

Submitter: David Zinck, NewburyPort Wiring Inspector

Recommendation:

Add an exception to read as follows:
Exception: Stacker devices designed for the purpose shall be allowed to secure the cable where installed in accordance with (a) and (b) below:
(a) the stacker devices are installed at intervals no greater than 600 mm (2 ft) and,
(b) the wire enters the stacker device from the top or the side.

Substantiation:

Stacker devices provide a very handy, safe, and neat way to do home runs in a house. With the cable supported at a maximum of 2 ft the spport is equivalent to runing through holes in studs. The purpose of (b) is to ensure that the wire snaps down into the device. If the devices were installed with the openings to the bottom, not much cable would have to fall out before the weight of the cable would pull the wire out of the others. Also, there is at least one manufacturer that has a device that the wires snap into on both sides. On such a device only the top half could be used on horizontal runs.

Panel Meeting Action: Reject

Panel Statement:

334.30 does not prohibit using this type of device.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

BROWN: The panel statement concerning 334.30 indicated that the use of "stacker devices" are not prohibited by the NEC. This proposal would recognize and regulate their use in an installation and should be considered.

7-132 Log #1239 NEC-P07 **Final Action: Accept**
(334-15(B))

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
(B) Protection from Physical Damage. The cable shall be protected from physical damage where necessary by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC rigid nonmetallic conduit, ~~pipe, guard strips, listed surface metal or nonmetallic raceway,~~ or other approved means. Where passing through a floor, the cable shall be enclosed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC rigid nonmetallic conduit, ~~listed surface metal or nonmetallic raceway, or other metal pipe~~ or other approved means extending at least 150 mm (6 in.) above the floor.

Substantiation:

Pipe, guard strips, listed surface metal or nonmetallic raceways are not listed for areas of physical damage and should not be referenced. These raceways and methods will not provide the physical strength required to protect the NM cable in an area that has been determined as an area of physical damage.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-133 Log #1805 NEC-P07 **Final Action: Reject**
(334-15(B))

Submitter: William A. Wolfe, Steel Tube Institute of North America

Recommendation:

Revise to read:
Where subject to physical damage t~~T~~he cable shall be protected ~~from physical damage where necessary~~ by...

Substantiation:

This text is consistent with that used throughout the NEC for wiring methods that may be subject to physical damage. It makes it clear that physical protection is always to be provided where the cable is subject to physical damage.

Panel Meeting Action: Reject

Panel Statement:

The action on Proposal 7-132 explains how the cable must be protected where subject to physical damage.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-134 Log #2037 NEC-P07 (334-15(B)) **Final Action: Accept**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

This suggested change would move the text from 334.10(B)(3) to a new sentence at the end of 334.15(B) as follows:

(B) Protection from Physical Damage. The cable shall be protected from physical damage where necessary by conduit, electrical metallic tubing, Schedule 80 PVC rigid nonmetallic conduit, pipe, guard strips, listed surface metal or nonmetallic raceway, or other means. Where passing through a floor, the cable shall be enclosed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC rigid nonmetallic conduit, listed surface metal or nonmetallic raceway, or other metal pipe extending at least 150 mm (6 in.) above the floor.

Where Type NMC cable is installed in shallow chases in masonry, concrete, or adobe, the cable shall be protected against nails or screws by a steel plate at least 1.59 mm (1/16 in.) thick and covered with plaster, adobe, or similar finish.

Substantiation:

This information was previously located under "uses permitted" and should more appropriately be inserted within Section 334.15(B) since this section is dealing with protection from physical damage.

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This is a companion proposal to revise 334.12 to include the Uses Permitted Language.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

7-135 Log #1240 NEC-P07 (334-15(C)) **Final Action: Reject**

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

(C) In Unfinished Basements. Where the cable is run at angles with joists in unfinished basements, it shall be permissible to secure cables not smaller than two 6 AWG or three 8 AWG conductors directly to the lower edges of the joists. Smaller cables shall be run either through bored holes in joists or on running boards. NM cable used on a wall of a unfinished basement shall be installed in a listed conduit or tubing. Conduit or tubings shall utilize a nonmetallic bushing or adapter at the point where the cable enters the raceway. Metal conduit and tubings and metal outlet boxes shall be grounded.

Substantiation:

This proposal is to clarify that NM cable used in an unfinished basement must be installed into a raceway when coming down a wall to a device box. The nonmetallic bushing or adapter for the raceways is required to prevent possible damage to the sheathing on the cable. All metal components are required to be grounded.

Panel Meeting Action: Reject

Panel Statement:

334.15(A) and (B) address the submitter's concerns.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-136 Log #1720 NEC-P07 **Final Action: Reject**
(334-18 (New))

TCC Action:

It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 2 for consideration of action in Article 210. This action will be considered by the panel as a public comment.

Submitter: Lawrence S. Cross, Burlington County Institute of Technology

Recommendation:

Add a new section to Article 334:
334.18 Arc-Fault Protection. Type NM, Type NMC and Type NMS cables installed in dwelling units shall be protected by an Arc-Fault circuit Interrupter

Substantiation:

In the 2002 code, the permitted use of Romex (type NM) has been expanded. This expansion of the use of NM occurred in light of all of the attention to the new AFCI requirements in 210.12. Type NM cable is literally 35 percent of the successful substantiation for the AFCI. This new requirement was driven by the fact that there are far too many electrical fires occurring in dwelling units. This new Arc-Fault device must protect the "entire branch circuit" as required by 210.12. The reason for this "entire branch circuit" protection is due to the fact that the Consumer Product Safety Commission studies show that at least 35 percent of these fires occur in the branch circuit. This occurs when a nail pokes through the cable or some other damage occurs. Take a look at any of the AFCI manufacturer's literature, all of the major players show sketches or pictures of type NM cable getting pinched or pierced. Two brochures are included with this proposal. Notably absent from these brochures is metal jacketed cable assemblies and/or raceways. The type of damage to branch circuit conductors for which the AFCI was created is almost exclusively limited to romex (type NM) cable. There is a tremendous difference in the ability to withstand physical damage between metal jacketed cables and type NM. Type NM cable is of a "class less than." Type NM cable is used predominantly in dwelling units throughout the United States. There is no reason to overlook the following facts:

1) Type NM cable does not have a metal jacket and is extremely vulnerable to damage.
2) The AFCI is proven to provide the additional protection needed for NM installations in dwelling units.
3) This proposal will address only dwelling units.

Note: Supporting material is available for review at NFPA headquarters.

Panel Meeting Action: Reject

Panel Statement:

AFCI protection requirements are the responsibility of Code-Making Panel 2.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

BROWN: The submitter included a great deal of material to substantiate this proposal. I feel the proposal should have been referred to CMP-2 for action in the same manner that CMP-6 referred proposal 6-31 to CMP-7 for action during the ROP meetings.

7-137 Log #1833 NEC-P07 **Final Action: Reject**
(334-23)

Submitter: David Zinck, NewburyPort Wiring Inspector

Recommendation:

Revise as follows:
334.23 In Accessible Attics. The installation of cable in accessible attics or roof spaces shall ~~also~~ comply with 320.23.

Substantiation:

Having the word "also" means that all of the requirements of Article 334 are in force and any additional requirements of 320.23 will apply. The purpose of 334.23 is to allow the less stringent requirements of 320.23 to apply to NM cable.

Panel Meeting Action: Reject

Panel Statement:

"Also" is correct. The requirements of 320.23 are in addition to the requirements specified in 334.15 and 334.17.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-138 Log #183 NEC-P07 **Final Action: Reject**
(334-30)

Submitter: Lloyd L. Gadbois, Village of Bradley / Rep. IBEW Local 176

Recommendation:

Revise text as follows:
334.30 Securing and Supporting. Nonmetallic-sheathed cable installed in vertical stud spaces and parallel to the studs may ~~shall~~ be secured by staples, cable ties, straps, hangers or similar fittings designed and installed to sufficiently control wild or wayward cables and so as not to damage the cable. ~~at intervals not exceeding 1.4 m (4 1/2 ft) and within 300 mm (12 in.) of every cabinet, box or fitting.~~ Flat cables shall not be stapled on edge.

Substantiation:

Requiring cable to be secured within 12 inches of an enclosure is unnecessary. The weight of the two or more feet of cable concerned is not enough to require such support. The proper use of listed connectors in the enclosures will do the job.

Panel Meeting Action: Reject

Panel Statement:

3.1.1. of the NEC Style Manual states that "may or can" shall not be used in mandatory rules. Not all boxes have integral clamping devices. "Wild or wayward" are vague and unenforceable terms not in compliance with 3.2.1 of the NEC Style Manual.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-139 Log #972 NEC-P07 **Final Action: Reject**
(334-30)

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Revise text to read as follows:
"...concealed in or under...".

Substantiation:

As presently worded, it not clear that it is permissible to fish cable through, for example, a permanently-dry crawlspace. Not all would consider such a location "in" the structure. Yet it can offer a similar level of protection to spaces in a structure. It has to be dry, and it cannot be subject to mechanical harm, in accordance with 334-10 and 334-12.

Panel Meeting Action: Reject

Panel Statement:

Crawlspace, by definition, is accessible. The proposed wording does not enhance clarity. Additionally, it may be in contact with the earth and, thereby, subject to damp, wet, and corrosive conditions.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-140 Log #1097 NEC-P07 **Final Action: Reject**
(334-30 (New))

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence.
All support straps, clips, hangers, and similar support hardware shall be identified for the purpose.

Substantiation:

Conduit straps, clips, hangers may not be considered "fittings".
According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

The current requirement is that the securing means be designed and installed so as to not damage the cable. Support and securing can be achieved in many ways and standard hardware items are generally acceptable. To require each of these items to be identified for each purpose, is overly restrictive. There is insufficient substantiation to support the change.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-141 Log #1505 NEC-P07 **Final Action: Reject**
(334-30)

Submitter: Dave "Pip" Sutton, Encompass

Recommendation:

Add new text to read as follows:
334.30 Securing and Supporting. Nonmetallic-sheathed cable shall be secured by nonmetallic staples, cable ties, straps, hangers, or similar fittings designed and installed so as not to damage the cable at intervals not exceeding 1.4 m (4 1/2 ft) and within 300 mm (12 in.) of every cabinet, box, or fitting. Flat cables shall not be stapled on edge.

Substantiation:

Use of metallic staples overdriven into wood studs or joists could cause arcing or for a current bearing conductor to build enough heat to induce a fire by energizing the staple.

Panel Meeting Action: Reject

Panel Statement:

Nonmetallic staples are not prohibited, and insufficient substantiation was provided to prohibit the use of metallic staples.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-142 Log #1714 NEC-P07 (334-30) **Final Action: Accept in Principle in Part**

Submitter: Thomas E. Trainor, City of San Diego / Rep. IAEI

Recommendation:

Revise 334.30 to read as follows:

334.30 Securing and Supporting. Nonmetallic-sheathed cable shall be supported and secured by staples, cable ties, straps, hangers, or similar fittings, designed and installed so as not to damage the cable, at intervals not exceeding 1.4 m (4 1/2 ft) and within 300 mm (12 in.) of every outlet box, junction box, cabinet, or fitting. Flat cables shall not be stapled on edge.

(A) Horizontal Runs Through Holes and Notches. In other than vertical runs, cables installed in accordance with 300.4 shall be considered supported and secured where such support does not exceed 1.4 m (4 1/2 ft) intervals and the nonmetallic-sheathed cable is securely fastened in place by an approved means within 300 mm (12 in.) of each box, cabinet, conduit body or other nonmetallic-sheathed cable termination.

(B) Unsupported Cables. Nonmetallic-sheathed cable shall be permitted to be unsupported where the cable:

(1) Is fished between access points ~~where~~ through concealed spaces in finished buildings or structures ~~or finished panels for prefabricated buildings~~ and supporting is impracticable; or

(2) Is not more than 1.4 m (4 1/2 ft) in length from the last point of cable support ~~for~~ to the point of connections ~~within an accessible ceiling~~ to a luminaire~~(s)~~ ([lighting fixture~~(s)~~]) or other piece of electrical equipment and the cable and point of connection are within an accessible ceiling.

(C) Cable Trays. Nonmetallic-sheathed cable installed in cable trays shall comply with 392.8(B).

(D) Wiring Device Without a Separate Outlet Box. A wiring device identified for the use, without a separate outlet box, incorporating an integral cable clamp shall be permitted where the cable is secured in place at intervals not exceeding 1.4 m (4 1/2 ft) and within 300 mm (12 in.) from the wiring device wall opening, and there shall be at least a 300 mm (12 in.) loop of unbroken cable or 150 mm (6 in.) of a cable end available on the interior side of the finished wall to permit replacement.

If the proposed revisions are accepted, the section would read as follows:

334.30 Securing and Supporting. Nonmetallic-sheathed cable shall be supported and secured by staples, cable ties, straps, hangers, or similar fittings, designed and installed so as not to damage the cable, at intervals not exceeding 1.4 m (4 1/2 ft) and within 300 mm (12 in.) of every outlet box, junction box, cabinet, or fitting.

(A) Horizontal Runs Through Holes and Notches. In other than vertical runs, cables installed in accordance with 300.4 shall be considered supported and secured where such support does not exceed 1.4 m (4 1/2 ft) intervals and the nonmetallic-sheathed cable is securely fastened in place by an approved means within 300 mm (12 in.) of each box, cabinet, conduit body or other nonmetallic-sheathed cable termination.

(B) Unsupported Cables. Nonmetallic-sheathed cable shall be permitted to be unsupported where the cable:

(1) Is fished between access points through concealed spaces in finished buildings or structures and supporting is impracticable; or

(2) Is not more than 1.4 m (4 1/2 ft) in length from the last point of cable support to the point of connection to a luminaire (lighting fixture) or other piece of electrical equipment and the cable and point of connection are within an accessible ceiling.

(C) Cable Trays. Nonmetallic-sheathed cable installed in cable trays shall comply with 392.8(B).

(D) Wiring Device Without a Separate Outlet Box. A wiring device identified for the use, without a separate outlet box, incorporating an integral cable clamp shall be permitted where the cable is secured in place at intervals not exceeding 1.4 m (4 1/2 ft) and within 300 mm (12 in.) from the wiring device wall opening, and there shall be at least a 300 mm (12 in.) loop of unbroken cable or 150 mm (6 in.) of a cable end available on the interior side of the finished wall to permit replacement.

Substantiation:

Editorial changes which, with companion proposals, are intended to provide consistent wording for the securing and supporting requirements in 334, 320, 330 and 332.

Panel Meeting Action: Accept in Principle in Part

In the recommended text, add the following FPN after (A):

"FPN: See 314.17(C) for support where nonmetallic boxes are used."

In (B)(1), delete "; or " from the end of the sentence.

The panel does not Accept the addition of (C).

Panel Statement:

The panel understands that in 334.30, first paragraph the words "outlet box, junction box" will be included in the proposed language as added text.

The panel did not Accept the addition of (C) since it is covered in 392.8(B).

Number Eligible to Vote: 15

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-143 Log #1134 NEC-P07 **Final Action: Reject**
(334-30, FPN (New))

Submitter: Ray C. Mullin, Ray C. Mullin / Rep. Ray C. Mullin Books

Recommendation:

Add fine print note to read as follows:
FPN: See 312.5(C) for cable entry requirements into surface mounted enclosures.

Substantiation:

Adding this fine print note to Article 334 will make it easier for the user of the NEC to locate the permission given to allow NM cable entries into the top of surface mounted enclosures through one raceway, provided certain conditions are met.

Panel Meeting Action: Reject

Panel Statement:

Since 312.5(C) already applies, a fine print note is not considered necessary.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

SCHUMACHER: I disagree with the panel, adding a fine print note here would serve to make it easier to find this particular reference.

7-144 Log #1605 NEC-P07 **Final Action: Accept in Principle**
(334-30 Exception (New))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add new text to read as follows:
Exception: Sections of cable protected from physical damage by a raceway or pipe.

Substantiation:

The literal wording presently implies that when the protection required in 334.15(B) is raceway or pipe, it must be limited to a maximum length of 4 1/2 ft so as to allow the installation of the fittings required by 334.30. This change will both acknowledge the implicit acceptance of such sleeves as means of support and eliminate an implicit length restriction to 334.15(B) that the CMP has heretofore demurred from specifying.

Panel Meeting Action: Accept in Principle

In existing 334.30, add a new second paragraph, to read as follows:
"Sections of cable protected from physical damage by raceway shall not be required to be secured within the raceway."

Panel Statement:

The added text eliminates the need for an exception.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

SCHUMACHER: The wording in 334.30(B) where cable is "fished" into a raceway for protection should be sufficient to satisfy this concern.

7-145 Log #184 NEC-P07 **Final Action: Reject**
(334-30(A))

Submitter: Lloyd L. Gadbois, Village of Bradley / Rep. IBEW Local 176

Recommendation:

Revise text as follows:
334.30(A) Horizontal Runs Through Holes and Notches. In other than vertical runs, cables installed in accordance with 300.4 shall be considered supported and secured where such support does not exceed 1.4 m (4 1/2 ft) and the nonmetallic-sheathed cable is securely fastened in place by an approved means ~~within 300 mm (12 in.) of each~~ to a box, cabinet, conduit body or other nonmetallic-sheathed cable termination.

Substantiation:

Requiring staples within 12 in. of the enclosure has resulted in the violation of the bend radius stipulation by using staples immediately at the edge of the bored hole in the stud. It should not be necessary to use staples or any other device on NM cables run horizontally through studs.

Panel Meeting Action: Reject

Panel Statement:

The location of the hole in the stud should be so located such that the bend radius requirements are met.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-146 Log #1824 NEC-P07 **Final Action: Reject**
(334-30(B) (New))

Submitter: Christopher Clapp, Constitution Electric Corp

Recommendation:

Add paragraph (B):
(B) When cables are laying on top of strapping or any other structural member of the building that allows for the support of the cable.

Substantiation:

The practice of running type NM cable in the bays of buildings and using the strapping as support has been questioned. It is of my opinion the cable is less subject to damage with this method of support.

Panel Meeting Action: Reject

Panel Statement:

Section 334.30(B) that addresses unsupported cables already exists. The panel is not sure where the submitter wants the text to be added. The cable must still be secured if it is supported by strapping.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-147 Log #2413 NEC-P07 **Final Action: Reject**
(334-30(B)(2))

Submitter: Wayne Sargent, City of Salem, Oregon

Recommendation:

(B) Unsupported Cables. Nonmetallic-sheathed cable shall be permitted to be unsupported where the cable:
(2) Is permitted by 334.10 and does not rest on the ceiling grid as prohibited by 300.11(A) and is not more than 1.4 m (4 1/2 ft) from the last point of support for connections within an accessible ceiling to luminaire(s) [lighting fixture(s)] or equipment.

Substantiation:

The problem is an apparent conflict between the intent of 300.11(A) to keep cables and raceways off of the ceiling grid system, and the three wiring methods [AC, MC and NM cable] permitted to be unsupported in short lengths. With recent changes to Chapter 8, it appears to be the intent of the NEC to clean up the area above suspended ceilings. These short unsupported “whips” above grids are often installed in standard 1.8 m [6 foot] lengths. Most electricians tie these up in some way; however, many times they are left laying on the grid. If it is only 2 feet from the j-box to the luminaire, there can be 4 feet of cable resting on the ceiling grid if they interpret the permission to be unsupported that is granted by the applicable wiring method section [320.30(B)(3), 330.30(B)(2), and 334.30(B)(2)], as permission to ignore 300.11(A).

Panel Meeting Action: Reject

Panel Statement:

This requirement is already in place in 300.11(A).

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-148 Log #185 NEC-P07 **Final Action: Reject**
(334-30(B)(3) (New))

Submitter: Lloyd L. Gadbois, Village of Bradley / Rep. IBEW Local 176

Recommendation:

Add new text as follows:
334.30(B) Unsupported Cables. Nonmetallic-sheathed cable shall be permitted to be unsupported where the cable;
(3) Is installed into a stud space through the double plate directly into an outlet enclosure for a switch(s), receptacle(s), or other utilization or control device(s).

Substantiation:

Eight or even ten feet of NM cable is not heavy enough to require support. Allowing it to hang freely inside of the space makes it impossible to penetrate it with a nail or screw. Holding it firmly against the stud makes it easily accidentally penetrable.

Panel Meeting Action: Reject

Panel Statement:

The cable must be secured if it is installed into a stud space, unless the wall finish has been installed and the cable is fished. No definitive substantiation was provided for the change.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-149 Log #186 NEC-P07 **Final Action: Reject**
(334-30(C))

Submitter: Lloyd L. Gadbois, Village of Bradley

Recommendation:

Revise text as follows:
"334.30(C) Wiring device without a separate outlet box. A wiring device identified for the use, without a separate outlet box, incorporating an integral cable clamp shall be permitted where the cable is secured in place at intervals not to exceed .9 m (3 ft) ~~1.4 m (4 1/2 ft) and within 300 mm (12 in.)~~ from the wiring device wall opening, and ...".

Substantiation:

Any listed "integral cable clamp" designed for use with a separate outlet box should reasonably be expected to be capable of supporting .914 m (3 ft) of NM cable as well as the 12 in. loop required in this article.
Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

No technical substantiation was provided to delete the requirement that NM cable be secured within 300 mm (12 in.) of the wall opening.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-150 Log #1464 NEC-P07 **Final Action: Reject**
(334-40)

Submitter: Jamie McNamara Hastings, MN

Recommendation:

I put a strike through deleted text.
334.40 Boxes and Fittings.
(A) Boxes of Insulating Material. Nonmetallic outlet boxes shall be permitted as provided in 314.3.
(B) Devices of Insulating Material. Switch, outlet, and tap devices of insulating material shall be permitted to be used without boxes in exposed cable wiring ~~and for rewiring in existing buildings where the cable is concealed and fished~~. Openings in such devices shall form a close fit around the outer covering of the cable, and the device shall fully enclose the part of the cable from which any part of the covering has been removed. Where connections to conductors are by binding-screw terminals, there shall be available as many terminals as conductors.
(C) Devices with Integral Enclosures. Wiring devices with integral enclosures identified for such use shall be permitted as provided in 300.15(E).

Substantiation:

This wording is very confusing and leads to misinterpretation and installers making splices with plastic devices and concealing the splices in the walls and ceiling that are not accessible and one would need to remove the wall and ceiling finish looking for the splices.

Panel Meeting Action: Reject

Panel Statement:

300.12 requires the mechanical continuity of cable sheaths between cabinets, boxes, fittings, or other enclosures or outlets.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-151 Log #3172 NEC-P07 **Final Action: Reject**
(334-80)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass Electrical Code Adv. Committee

Recommendation:

Revise to read as follows:
334.80 Ampacity. Type NM, NMC, and NMS cable shall have conductors rated at 90°C (194°F). Where installed in thermal insulation, the ampacity of conductors shall be that of 60°C (140°F) conductors. The ampacity of Types NM, NMC, and NMS cable installed in the cable tray shall be determined in accordance with 392.11.

Substantiation:

The 2002 NEC contains a technical error. The NEC does not condition the increased ampacity allowances on the cables being run in open air, as it does with Type AC cable in 320.80. This wording incorporates that concept. Studies done by UL and NEMA conclusively demonstrate the severe effect that thermal insulation has on conductor ampacities. See, for example, Proposals 7-131 and 4-97 in the 1987 NEC cycle for original substantiation. This wording is technically appropriate and it has been in the Massachusetts Code for five cycles of the Code at this point, without any reported problem.

Panel Meeting Action: Reject

Panel Statement:

334.112 specifies the requirement for 90°C insulated conductors. 334.80 already specifies that the ampacity of these cables cannot exceed the 60°C values in any installation.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-150a Log #CP700 NEC-P07 **Final Action: Accept**
(334-80)

Submitter: Code-Making Panel 7

Recommendation:

Add a new paragraph to 334.80 to read as follows:
"334.80 Where more than two NM cables containing two or more current-carrying conductors are bundled together and pass through wood framing which is to be fire- or draft-stopped using thermal insulation or sealing foam, the allowable ampacity of each conductor shall be adjusted in accordance with Table 310.15(B)(2)(a)."

Substantiation:

Code-Making Panel 6 Rejected Proposal 6-31 to add the proposed text to 310.15(B)(2)(a) and provided the following Panel statement: "The Panel agrees with the intent of the Proposal, however, this material is more appropriately addressed in 334.80 since the Proposal only applies to one type of cable, and Code-Making Panel 6 covers all wiring methods. Therefore, Code-Making Panel 6 has forwarded this Proposal to Code-Making Panel 7 for action."
The substantiation provided by the submitter, Travis Lindsey, of Proposal 6-31 was:
"Recent experimentation shows the possibility of dangerous conditions when loaded circuits are brought into close proximity to each other inside a fire- or draft-stop, where the ability to dissipate heat is extremely limited. Cable temperatures well in excess of their 90°C rating were encountered, with no overcurrent protection present for these conditions. Results indicate that immediate adjustments should be made to the NEC to apply at least to the specific case represented by the experiment. Such a proposal is being made, with a supplemental report offered as technical support."

Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

7-152 Log #1419 NEC-P07 **Final Action: Reject**
(334-100)

Submitter: Richard P. Owen, City of St. Paul, Minnesota

Recommendation:

Revise text to read as follows:
334.100 Construction. The outer cable sheath of nonmetallic-sheathed shall be a nonmetallic material. <u>The outer sheath shall be color-coded to indicate the AWG sizing of the current-carrying conductors in the cable. The colors shall be as follows: size 14 AWG- white, size 12 AWG- yellow, size 10 AWG- orange, size 8 AWG and larger- black.</u>

Substantiation:

Although this would appear to endorse a particular brand of nonmetallic-sheathed cable, it really endorses the concept of color-coding for better identification of cable sizes after installation. I recently inspected a dwelling where this type of color-coded cable was used, and it was much easier to accurately verify the proper sizing of the conductors in cables without having to check each separate run of nonmetallic-sheathed cable in the house. In many cases, when an electrical inspection is done, the inspector just does not have the amount of time necessary to look at the marking on the sheath of each piece of cable. If this color-coding requirement was instituted with the standardized colors, the inspector could spend more time on other areas of the installation without the concern of having an undersized run of cable accidentally installed. This would also help the installer ensure the proper conductor size, and help prevent them from inadvertently running an undersized cable.
Since the cable manufacturers in many cases already do color their cable, the color-coding should be able to be instituted with a minimum of cost. Any added cost should be more than outweighed by the additional level of safety this system would provide.

Panel Meeting Action: Reject
Panel Statement:

Outer jacket color coding is a product design feature that should not be relied on in place of jacket marking.

Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

7-153 Log #1526 NEC-P07 **Final Action: Accept in Principle in Part**
(334-104)

Submitter: James M. Daly, General Cable

Recommendation:

Revise 334.104 as follows:
The insulated power or control conductors shall be sizes 14 AWG through 2 AWG ~~with~~ copper conductors or sizes 12 AWG through 2 AWG ~~with~~ aluminum or copper-clad aluminum conductors. The signaling conductors shall comply with 780.5. The communication conductors shall comply with Part V of Article 800.

Substantiation:

The words "or control" should be added since the insulated conductors are permitted to be used as either power or control conductors. Communication conductors are also permitted in Type NMS cable and the applicable portion of Article 800 should be referenced. The two words "with" are not necessary and removing them will improve clarity.

Panel Meeting Action: Accept in Principle in Part

Revise the recommended text to read as follows:
"The 600 volt insulated conductors shall be sizes 14 AWG through 2 AWG copper conductors or sizes 12 AWG through 2 AWG aluminum or copper-clad aluminum conductors. The signaling conductors shall comply with 780.5. The communication conductors shall comply with Part V of Article 800.

Panel Statement:

See panel action and statement of Proposal 7-96.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-154 Log #515 NEC-P07 **Final Action: Accept**
(334-108)

Submitter: James M. Daly, General Cable

Recommendation:

Delete the last sentence in 334.108 which reads: "Where provided, the grounding conductor shall be sized in accordance with Article 250."

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."
90.3 states that Chapters 1, 2, 3, and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-155 Log #1807 NEC-P07 **Final Action: Accept in Part**
(334-108)

Submitter: William A. Wolfe, Steel Tube Institute of North America

Recommendation:

Revise as follows:
Equipment Grounding. In addition to the insulated conductors, the cable shall ~~be permitted to~~ have an insulated or bare conductor for equipment grounding purposes only. ~~Where provided, t~~The grounding conductor shall be sized in accordance with 250.118.

Substantiation:

At the current time, the use of NM Cable has been expanded. In addition, the Code now requires that all switches and luminaires be grounded. It is time to require a ground wire in NM, not just permit one. Even if U.S. producers already include a ground wire, the Code should be clear in the event of imported NM that may not be so equipped. The change to the 250.118 reference is to comply with the Style Manual.

Panel Meeting Action: Accept in Part

In the recommended wording, the panel Accepts the deletion of "be permitted to".
The words "Where provided" and the second sentence were deleted by the action on Proposal 7-154.

Panel Statement:

The revised wording meets the intent of the submitter.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

SCHUMACHER: I agree with the panel action on this proposal, this is long overdue in becoming a code requirement.

7-156 Log #3166 NEC-P07 **Final Action: Reject**
(334-112)

Submitter: Eric Stromberg, The Dow Chemical Company

Recommendation:

Change the wording "insulated power conductors" to "insulated ungrounded conductors".

Substantiation:

Simply an effort to bring this paragraph into alignment with the spirit of the code definitions: "Grounded", "Ungrounded", and "Grounding".

Panel Meeting Action: Reject

Panel Statement:

The grounded current carrying conductor is a power conductor, and the current wording is clear and concise.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-157 Log #267 NEC-P07 **Final Action: Accept**
(336-2)

Submitter: James M. Daly, General Cable

Recommendation:

In 336.2, delete "for installation in cable trays, in raceways, or where supported by a messenger wire".

Substantiation:

The text to be deleted is not appropriate for a definition. The deleted text contains requirements or recommendations that are not permitted in Definitions in accordance with the National Electrical Code Style Manual, Section 2.2.2. It is more appropriate in Uses Permitted and is already addressed in 336.10(2), (3), and (6).

TC cable can be used in other installation conditions in industrial establishments, see 336.10(6).

Installation conditions are not included in the Definitions in the other cable Articles.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-158 Log #2941 NEC-P07 **Final Action: Reject**
(336-6 (New))

Submitter: Martin J. Brett, Jr.

Recommendation:

Revise text as follows:
336.6 Listing Requirements. Type TC cable and associated fittings shall be listed.

Substantiation:

As the supply chain becomes more global and the acceptance of the NEC grows internationally, it is important to clearly state the intent to require a listed product. Also, with the introduction of the common numbering system last cycle, xxx.6 was reserved for "Listing Requirements". Without an entry for 336.6 in this renumbered article, it could be assumed that these products do not need to be listed. The objective is to guarantee that Type TC cables installed in accordance with this article meet a minimum standard of performance for safety. The intent is that this product be evaluated and listed in accordance with the appropriate product standard.

Panel Meeting Action: Reject

Panel Statement:

There are several methods of approving products. One method should not be defined to the exclusion of the others.

Substantiation has not been provided to indicate that there is a problem with the current products. Standard products are listed, however, products designed for special applications or conditions may not fit the listing criteria. This change would limit the discretion of the Authority Having Jurisdiction to use means other than a listing to determine acceptability for special circumstances.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-7.

CANGEMI: See my Explanation of Negative on Proposal 7-7.

SCHUMACHER: Even though it is required that products be listed in other parts of the code, this would make it perfectly clear that this product must be listed to meet the standards of this code.

STEWART: See my Explanation of Negative for Proposal 7-7.

7-159 Log #268 NEC-P07 **Final Action: Accept**
(336-10)

Submitter: James M. Daly, General Cable

Recommendation:

Revise the following portions of 336.10:
Delete the phrase "in the following" from the end of the first sentence.
Change (2) to read "In cable trays"
Add "(3) In raceways"
Add "(4) In outdoor locations supported by a messenger wire"
Renumber (3) through (7) as (5) through (9).

Substantiation:

Deleting the last phrase in the first sentence will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Changing the three items in (2) to three list items will make the list more consistent.

The new (4) clarifies that Type TC cable is also permitted to be supported by a messenger wire in outdoor locations. Type TC cable can also be installed in cable tray in outdoor locations. The present text could be narrowly interpreted to mean that TC cable could only be installed in outdoor locations on a messenger.

Panel Meeting Action: Accept

Panel Statement:

The panel understands that the action taken on this proposal will be superceded by the actions taken on Proposals 7-160 and 7-172.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-160 Log #2039 NEC-P07 **Final Action: Accept**
(336-10)

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the following text:
~~336.10 Uses Permitted.~~
~~Type TC tray cable shall be permitted to be used in the following:~~
~~(1) For power, lighting, control, and signal circuits.~~
~~(2) In cable trays, or in raceways, or where supported in outdoor locations by a messenger wire.~~
~~(3) In cable trays in hazardous (classified) locations as permitted in Articles 392, 501, 502, 504, and 505 in industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation.~~
~~(4) For Class I circuits as permitted in Article 725.~~
~~(5) For non-power-limited fire alarm circuits if conductors comply with the requirements of 760.27.~~
~~(6) In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, and where the cable is continuously supported and protected against physical damage using mechanical protection, such as struts, angles, or channel, Type TC tray cable that complies with the crush and impact requirements of Type MC cable and is identified for such use shall be permitted between a cable tray and the utilization equipment or device. The cable shall be secured at intervals not exceeding 1.8 m (6 ft). Equipment grounding for the utilization equipment shall be provided by an equipment grounding conductor within the cable.~~
~~(7) Where installed in wet locations, Type TC cable shall also be resistant to moisture and corrosive agents.~~
~~FPN:See 310.10 for temperature limitation of conductors.~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-8.

GOTHAM: See my Explanation of Negative on Proposal 7-8.

SCHUMACHER: The uses permitted is a quick reference to what the cable can be used for, and is totally separate from uses not permitted. While there may be certain areas where the task group can streamline the uses permitted to make it more economical, using a "shotgun" approach to this will only make the code more confusing to the people in the field.

STEWART: See my Explanation of Negative for Proposal 7-8.

7-161 Log #269 NEC-P07 **Final Action: Accept**
(336-10(3))

Submitter: James M. Daly, General Cable

Recommendation:

Delete 336.10(3).

Substantiation:

This deletion will eliminate a conflict within the Code. 336.10(3) limits the use of TC cable in hazardous locations to "industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation."

392.3(D) states that "Cable trays in hazardous (classified) locations shall contain only the cable types permitted in 501.4, 502.4, 503.3, 504.20, and 505.15." There is no mention of the limitation stated in the previous paragraph.

Chapter 5 permits Type TC cable to be installed in some hazardous (classified) locations with no mention of the limitation.

90.3 states that "Chapters 1, 2, 3, and 4 apply generally; Chapters 5, 6, and 7 apply to special occupancies, special equipment, or other special conditions."

CMP 14 is responsible for hazardous locations. If CMP 14 wants to place restrictions on the use of TC cable in hazardous locations, the restrictions should be included in 501.4, 502.4, 503.3, 504.20, or 505.15, not in Chapter 3.

Also, Article 503 is not included in 336.10(3).

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-162 Log #516 NEC-P07 **Final Action: Accept in Part**
(336-10(3))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(3) In cable trays in hazardous (classified) locations as permitted in 392.3, 501.4, 502.4, 503.3, 504.20, and 505.15 ~~Articles 392, 501, 502, 504, and 505~~ in industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept in Part

In the recommendation, the panel Accepts the deletions, but rejects the additional new text.

Panel Statement:

See panel action on Proposal 7-160.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-163 Log #270 NEC-P07Meeting Action: Accept **Final Action: Reject**
(336-10(4))

TCC Action: Reject

The Technical Correlating Committee directs that this Proposal be reported as "Reject" to correlate with the panel action on Proposal 7-160.

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
(4) For Class I circuits as permitted in 725.27 ~~Article 725~~.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."

Panel Meeting Action: Accept

Panel Statement:

The panel understands that the action taken on this proposal will be superceded by the actions taken on Proposals 7-160 and 7-172.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-164 Log #517 NEC-P07Meeting Action: Accept in Principle **Final Action: Reject**
(336-10(4))

TCC Action: Reject

The Technical Correlating Committee directs that this Proposal be reported as "Reject" to correlate with the panel action on Proposal 7-160.

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(4) For Class I circuits as permitted in Part II of Article 725.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept in Principle

In the recommended wording, revise to read "Parts II and III of Article 725."

Panel Statement:

The panel understands that the action taken on this proposal will be superceded by the actions taken on Proposals 7-160 and 7-172.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-165 Log #1594 NEC-P07 **Final Action: Accept in Principle**
(336-10(6))

Submitter: James M. Daly, General Cable

Recommendation:

Add the following sentence at the end of 336.10(6):
In cables containing conductors size 6 AWG or smaller, the equipment grounding conductor shall be provided within the cable or, at the time of installation, one or more insulated conductors shall be permanently identified as an equipment grounding conductor in accordance with 250.119(B).

Substantiation:

This text was inadvertently omitted from the 2002 Code.
CMP 7 Accepted in Principle Proposal 7-244 for the 2002 Code to "add an additional sentence to the last paragraph of 340-4(6) so the paragraph reads:
"Equipment grounding for the utilization equipment shall be provided by an equipment grounding conductor within the cable. In cables containing conductors size 6 AWG or smaller, the equipment grounding conductor shall be provided within the cable or, at the time of installation, one or more insulated conductors shall be permanently identified as an equipment grounding conductor in accordance with 250-119(b)."
"The TCC added a note to the Proposal which read: "Note: The Technical Correlating Committee understands that the accepted text replaces the text in the last paragraph of 340-10(6) of Proposal 7-231a."
There were no Comments submitted on Proposal 7-244 so the Panel Action on the Proposal was still valid.
There was only one Comment submitted on Proposal 7-231a and that was rejected. Also, it pertained to 340-2.
Comment 7-115 was submitted on Proposal 7-245 that addressed 340-4(6). However, the Comment requested revisions in the first two paragraphs of 340-4(6) and simply included the existing last paragraph from the 1999 NEC. Tom Guida made an Affirmative Comment regarding the Panel Action on Proposal 7-244. Apparently, this was not caught by the TCC during their review since no Comments were submitted on Proposal 7-244. Since Proposal 7-244 was not reconsidered during the Comment stage and the only Comment on Proposal 7-231a was rejected, the Panel Action on Proposal 7-244 was still valid.
NFPA staff agreed that the omission of the last sentence was an error and it would be added to the 2002 Code errata sheet. Since the deadline for submitting proposals for the 2005 Code was close, this proposal is being submitted to be sure it is corrected in the 2005 Code.

Panel Meeting Action: Accept in Principle

Acceptance of this proposal will modify 336.12(7)f. in the panel action of Proposal 7-172 and 7-160.
The text in this proposal shall be added to 336.12(7)f as shown in Proposal 7-172.

Panel Statement:

This additional text is included on the 2002 NEC Errata sheet dated December 20, 2002. The comma after "at the time of installation" shall be included even though it does not appear on the Errata sheet.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-166 Log #1889 NEC-P07 **Final Action: Reject**
(336-10(6))

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
(6) In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, and where the cable is continuously supported and protected against physical damage using mechanical protection, such as struts, angles, or channel, Type TC tray cable that complies with the crush and impact requirements of Type MC cable and is identified for such use shall be permitted between a cable tray and the utilization equipment or device. The cable shall be secured at intervals not exceeding 1.8 m (6 ft). Equipment ~~grounding~~ bonding for the utilization equipment shall be provided by an equipment ~~grounding~~ bonding conductor within the cable.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250

Panel Meeting Action: Reject

Panel Statement:

The panel agrees that there is confusion in the field surrounding these two terms and supports the concept of this change. However, the decision to use the terms "grounding" or "bonding" is the responsibility of Code-Making Panel 5. Code-Making Panel 7 requests that the Technical Correlating Committee appoint a task group to study the impact of such a change. Code-Making Panel 7 requests the opportunity to review any changes of these terms that are under their purview.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

STRANIERO: See my Comment on Affirmative on Proposal 7-1.

7-167 Log #3227 NEC-P07 **Final Action: Reject**
(336-10(6))

Submitter: Larry G. Watkins, Alcan Cable

Recommendation:

Change "requirements" to "capabilities" in line seven of the first sentence in 336.10(6).

Substantiation:

We believe that the Panel's decision to permit this use of Type TC Cable with "open wiring" marking was based on Type TC Cable meeting the capabilities and not just the requirements for impact and crush performance of Type MC Cable in accordance with UL 1569, Hence the word "requirements" should be replaced by "capabilities" so that UL 1277 can be modified accordingly to establish appropriate requirements for "open wiring" marking on Type TC cables.

This recognition by the Code Panel is essential to initiate the process to update the product standard.

Panel Meeting Action: Reject

Panel Statement:

The cable must comply with the crush and impact requirements in UL 1569 to be marked for open or exposed wiring; "capabilities" is a vague term that should not be used in accordance with 3.2.1 of the NEC Style Manual.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-168 Log #3258 NEC-P07 **Final Action: Reject**
(336-10(6))

Submitter: Gary J. Locke, Lockheed Martin Systems Integration

Recommendation:

Revise as follows:

336.10 Uses Permitted.

(6) ~~In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, and where the cable is continuously supported and protected against physical damage using mechanical protection, such as struts, angles, or channel,~~ Type TC tray cable that complies with the crush and impact requirements of Type MC cable and is identified for such use shall be permitted between a cable tray and the utilization equipment or device. The cable shall be installed in accordance with the provisions of Article 330 Metal-Clad Cable: Type MC ~~secured at intervals not exceeding 1.8 m (6 ft.).~~ Equipment grounding for the utilization equipment shall be provided by an equipment grounding conductor within the cable.

Substantiation:

Type TC cable constructed to satisfy the crush and impact resistance of Type MC cable is technically viable and has been effectively implemented in industrial establishments. The requirements of 336.10 have encouraged the creation of this new hybrid TC with MC properties type cable construction - which may truly constitute a new wiring method, and therefore may ultimately warrant a separate article in Chapter 3 of the NEC. A separate wiring method article, however, may be premature for the 2005 NEC cycle and that specific issue may be more appropriately addressed in the 2008 NEC cycle. In the interim, there is no technical justification for restricting the use of hybrid TC with MC properties type cable to industrial establishments, particularly if requirements for its installation are specified and consistent with an appropriate and comprehensive article such as Article 330 Metal-Clad cable; Type MC.

Panel Meeting Action: Reject

Panel Statement:

Type TC cable is not suitable to be installed exposed as a general wiring method. It is appropriate in limited lengths in an industrial establishment with limited access and that has trained and qualified personnel.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

RUNYON: When Type TC cable meets the crush and impact resistance of Type MC cable, there is no technical substantiation to prevent the installation of Type TC cable in short runs from the cable tray to utilization equipment in facilities where Type MC cable installation is permitted.

7-169 Log #3456 NEC-P07 **Final Action: Reject**
(336-10(6))

Submitter: Charles M. Trout, Maron Electric Co. Inc.

Recommendation:

Delete this section in its entirety.

Substantiation:

The National Electrical Code is prescriptive code. To say "where the conditions of maintenance and supervision ensure that only qualified persons service the installation," is a performance requirement. Without prescriptive requirements indicating whether this qualified person is an employee of the owner of the premises or is a separately contracted person and the Authority Having Jurisdiction has a means of verification of the continued employment of the qualified person and whether the qualified person has been verified by the authority having jurisdiction as meeting the definition of a qualified person as shown in the definitions of this Code no prescriptive requirements have been followed.

To permit relaxation of the safety requirements of this Code without establishing a positive guarantee that the safety of persons and property is indisputably assured is a reprehensible act.

Panel Meeting Action: Reject

Panel Statement:

"Qualified Person" is defined in Article 100. The submitter's concern has been addressed in CP701.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-170 Log #3457 NEC-P07 **Final Action: Reject**
(336-10(C)(3))

Submitter: Charles M. Trout, Maron Electric Co. Inc.

Recommendation:

Delete this section in its entirety.

Substantiation:

The National Electrical Code is prescriptive code. To say "where the conditions of maintenance and supervision ensure that only qualified persons service the installation," is a performance requirement. Without prescriptive requirements indicating whether this qualified person is an employee of the owner of the premises or is a separately contracted person and the Authority Having Jurisdiction has a means of verification of the continued employment of the qualified person and whether the qualified person has been verified by the authority having jurisdiction as meeting the definition of a qualified person as shown in the definitions of this Code no prescriptive requirements have been followed.

To permit relaxation of the safety requirements of this Code without establishing a positive guarantee that the safety of persons and property is indisputably assured is a reprehensible act.

Panel Meeting Action: Reject

Panel Statement:

"Qualified Person" is defined in Article 100. The submitter's concern has been addressed in CP701. In addition, the Section shown in the proposal does not exist.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-171 Log #271 NEC-P07 **Final Action: Accept in Principle**
(336-12)

Submitter: James M. Daly, General Cable

Recommendation:

Delete "used in the following" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Accept in Principle

Panel Statement:

The panel action on Proposal 7-172 meets the intent of the submitter.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-172 Log #2021 NEC-P07 **Final Action: Accept in Principle in Part**
(336-12)

TCC Action:

The Technical Correlating Committee understands that the Panel action on Proposal 7-165 further modifies 336.12(7)f in this Proposal and action on Proposal 7-173a further modifies 336.12(7)a.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Revise existing text to read as follows:
336.12 Uses Not Permitted. Type TC cable shall not be used under the following conditions or in the following locations:
(1) As an aerial cable unless supported by a messenger.
(2) For non-power limited fire alarm circuits unless the conductors comply with 760.27.
(3) For unsupported open runs except where all the following conditions are met:
a. The installation is in an industrial establishment, where the conditions of maintenance and supervision ensure that only qualified persons service the installation.
b. The unsupported run is between a cable tray and utilization equipment or device.
c. The cable is continuously supported and protected against physical damage using mechanical protection, such as struts, angles, or channel.
d. The cable is secured at intervals not exceeding 1.8 m (6 ft.).
e. The TC cable complies with the crush and impact requirements of Type MC cable and is identified for such use.
f. An equipment-grounding conductor for the utilization equipment is contained within the TC cable.
(4) For installation in a wet location unless the cable is resistant to moisture and corrosive agents.
(5) For installations where the cable is exposed to physical damage.
(6) Used where exposed to direct rays of the sun, unless identified as sunlight resistant.
7) Direct burial, unless identified for such use.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept in Principle in Part

Revise proposed (1) to read as follows:
"As an aerial cable unless supported by a messenger in outdoor locations."
Revise proposed (3) to read as follows: "For exposed runs unless all of the following conditions are met:".
In proposed (3)b., change "unsupported" to "exposed".
In proposed (3)f. delete "-" between "equipment" and "grounding".
Renumber (3) as list item (7), and renumber "4", "5", "6", and "7" to become "3", "4", "5" and "6".
Add a new (8) to read as follows: "For installation in other than cable trays, raceways, or where supported by a messenger ."
The panel accepts the remainder of the proposal.

Panel Statement:

Outdoor locations was added to (1) to reflect the existing 336.10(2) that limited TC cable supported by a messenger to outdoor locations. Changing "unsupported open" to "exposed" in 336.12(3) correlates with similar actions taken on other proposals by the panel.

The addition of item (8) was to clarify that TC cable shall only be installed in cable tray, raceways, or where supported by a messenger, unless specifically addressed in (1) thorugh (7).

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-12.

RUNYON: The manner in which the Panel changed the proposed 336.12(3) wording changes the intent for this type of application. The Panel replaced "unsupported open runs" with "exposed runs". Unsupported was the relevant term for this application. It allowed industrial establishments meeting the requirements, to drop Type TC cable unsupported out of the cable tray to the utilization equipment. Also c. is contradictory, requiring the cable to be continuously supported while at the same time allowing it to be unsupported. Recommend the revised text be changed to:

Type TC cable shall not be used under the following conditions or in the following locations:

(3) For unsupported exposed runs unless all of the following conditions are met:
a. The installation is in an industrial establishment where the conditions of maintenance and supervision ensure that only qualified persons service the installation.
b. The exposed run is between a cable tray and utilization equipment or device.
~~c. The cable is continuously supported and protected against physical damage using mechanical protection, such as struts, angles, or channel.~~
d. The cable is secured at intervals not exceeding 1.8 m (6 ft.).
e. The TC cable complies with the crush and impact requirements of Type MC cable and is identified for such use.
f. An equipment grounding conductor for the utilization equipment is contained within the TC cable.
SCHUMACHER: This should be rejected. See my Explanation of Negative Vote on Proposal 7-160.
STEWART: See my Explanation of Negative for Proposal 7-8.

7-173 Log #2903 NEC-P07 **Final Action: Accept in Principle**
(336-12(2))

Submitter: Dorothy Kellogg, American Chemistry Council

Recommendation:

Revise as follows:
(2) Installed outside a raceway or cable tray system ~~as open cable on brackets or cleats,~~ except as permitted in 336.10(6) ~~340.10(6).~~

Substantiation:

The term "open conduit" is not a defined term and seems to have the same meaning to some, as "open wiring". Elimination of both these terms with specific definitive texts will improve understanding of the requirements for the installation. See proposals presented on eliminating the phrase "Open Wiring", which appears more than 30 times in the current 2002 NEC, but it exists in two distinct formats: a) as the defined term "open wiring on insulators" by Article 398.2, or b) simply as the undefined term "open wiring". With the defined term, open wiring makes reasonable sense. However when used as the undefined term "open wiring', especially when used to describe a cable that is required to have mechanical integrity and protection takes on an entirely different meaning. Clearly such an installation is not "open". Due to the significant difference in the use of the terms, this and associated other proposals if accepted would replace the undefined use of the term "open wiring' with more appropriate language that addresses the installation in 501.4(B)(1)(5); 501.5 Exception No. 2; 503.3(B); 504.30(A)(1);l 505.15(C)(1)(c); 505.16(C)(1) Exception No. 2; 610.12(A); 725.61(D)(4); and 727.4(4)(5)(6); and use the full 398.2 defined term where the text suggests as in 300.16(A); 312.5(B); 314.17(B); 314.17(C). This proposal also corrects the reference to 336.10(6) rather than 340.10(6).

Panel Meeting Action: Accept in Principle

Panel Statement:

The panel action on 336.12(7) of Proposal 7-172 should address the submitter's concern.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-173a Log #CP701 NEC-P07 **Final Action: Accept**
(336-12(3)a)

Submitter: Code-Making Panel 7

Recommendation:

This action modifies the panel action in 336.12(7)a on proposal 7-172. 336.12(7)a will now read as follows:
"The installation is in an industrial establishment with written safety procedures, where the conditions of maintenance and supervision ensure that only qualified persons service the installation."

Substantiation:

Clarifies the definition of industrial establishment requirements, and provides consistency with other sections of the Code.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

RUNYON: Industrial establishments having or not having "written safety procedures", have no bearing on installing Type TC cable. This phrase was taken from 430.102(B) Exception (b). As used there, written lockout/tagout safety procedures are necessary and the inclusion of the phrase has merit.
STEWART: This Clause is an addition to existing language that imposes similar requirements to qualified persons in industrial establishments. 430.102(B)b relates to procedures that are necessary to identify the correct steps and equipment (disconnecting means for a motor and driven machinery) for operation and service. There is no technical substantiation to add this type of language "with written safety procedures" to existing requirements already qualifying the service personnel for servicing the installation of type TC tray cable.

7-174 Log #1779 NEC-P07 **Final Action: Reject**
(336-12(8))

Submitter: Craig M. Wellman , Newark, DE

Recommendation:

Add new paragraph:
(8) In Zone 1 hazardous (classified) locations, except where the installation is in an industrial establishment, the conditions of maintenance and supervision ensure that only qualified persons will service the installation, and the following conditions are met. The cable shall be listed for use in Class I, Zone 1 locations, with the crush and impact resistance of MC-HL cable, a gas/vaportight overall jacket of suitable polymeric material, and separate grounding conductors in accordance with Section 250.122. The installation shall meet the requirements of Article 505.

Substantiation:

This proposal recognizes that Class I, Zone 1 has a lower level of risk than Class I, Division 1 locations. A complimentary proposal for Article 505 requires that installation of this type be permitted only for connections between enclosures utilizing the "increased safety" type of protection "e". This type of protection applies to terminals and enclosures and does not involve sources of ignition.
Article 505 can only be applied where the classification of areas, selection of equipment and wiring methods are under the supervision of a qualified Registered Professional Engineer. This proposal assures a level of protection consistent with the requirements of Class I, Zone 1 locations.
The current requirements of Article 336 will apply to this application — The cable must be protected from physical abuse and secured at intervals not exceeding 1.8 m (6 ft).
This proposal is intended to be in alignment with a Usability Task Group proposal on Uses Permitted/Not Permitted.

Panel Meeting Action: Reject

Panel Statement:

Wiring methods in hazardous locations are the responsibility of Code-Making Panel 14. Chapter 3 is for general wiring methods.
Meeting the crush and impact requirements of MC-HL does not make a tray cable MC-HL.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-175 Log #436 NEC-P07 **Final Action: Reject**
(336-18)

Submitter: Pete Tremmel, Tremmel Electric

Recommendation:

Add new text as follows:
Cable shall be secured in place at intervals not exceeding 4 1/2 ft (1.37 m) and within 12 in. (305 mm) <u>but not closer than 3 in.</u> from every cabinet, box or fitting.

Substantiation:

When Romex (nonmetallic sheathed cable) is installed where it enters a switchbox or outlet box, it enters near the edge of the stud. When the cable is stapled within 3 in. of the box, it is bent, and closer to the edge of the stud, increasing the opportunity for a nail or screw to pierce the wire, causing a fire hazard.

Panel Meeting Action: Reject

Panel Statement:

Limiting the distance to 3 inches does not guarantee the cable will not be damaged. Based on the substantiation, the panel assumes that this proposal applies to 334.30 in the 2002 Code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-176 Log #518 NEC-P07 **Final Action: Accept**
(336-104(B))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(B) Thermocouple Circuits. Conductors in Type TC cables used for thermocouple circuits in accordance with <u>Part III of</u> Article 725 shall also be permitted to be any of the materials used for thermocouple extension wire.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-177 Log #3391 NEC-P07 **Final Action: Reject**
(338)

Submitter: Daniel Pipal, Circle Electric Inc.

Recommendation:

Insert:
Stripping recommendation to Article 338 for use in service mast for service entrance cable at 12 in. from mast.

Substantiation:

There is no strapping requirements so SE cable when used in mast to connect to supply or a FPN or a reference to Article 230.51(A).

Panel Meeting Action: Reject

Panel Statement:

230.51(A) applies. 90.3 stipulates that Chapters 1, 2, 3, and 4 apply generally.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-178 Log #2940 NEC-P07 **Final Action: Reject**
(338-6 (New))

Submitter: Martin J. Brett, Jr.

Recommendation:

Revise text as follows:
338.6 Listing Requirements. Type SE and USE cables shall be listed.

Substantiation:

As the supply chain becomes more global and the acceptance of the NEC grows internationally, it is important to clearly state the intent to require a listed product. Also, with the introduction of the common numbering system last cycle, xxx.6 was reserved for "Listing Requirements". Without an entry for 338.6 in this renumbered article, it could be assumed that these products do not need to be listed. The objective is to guarantee that Types SE and USE cables installed in accordance with this article meet a minimum standard of performance for safety. The intent is that this product be evaluated and listed in accordance with the appropriate product standard.

Panel Meeting Action: Reject

Panel Statement:

There are several methods of approving products. One method should not be defined to the exclusion of the others.

Substantiation has not been provided to indicate that there is a problem with the current products. Standard products are listed, however, products designed for special applications or conditions may not fit the listing criteria. This change would limit the discretion of the Authority Having Jurisdiction to use means other than a listing to determine acceptability for special circumstances.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-7.

CANGEMI: See my Explanation of Negative on Proposal 7-7.

SCHUMACHER: Even though it is required that products be listed in other parts of the code, this would make it perfectly clear that this product must be listed to meet the standards of this code.

STEWART: See my Explanation of Negative for Proposal 7-7.

7-180 Log #2040 NEC-P07 (338-10) **Final Action: Accept**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the following text in 338.10:

~~338.10 Uses Permitted.~~

~~(A) Service-Entrance Conductors. Service-entrance cable used as service-entrance conductors shall be installed as required by Article 230.~~

~~Type USE used for service laterals shall be permitted to emerge from the ground outside at terminations in meter bases or other enclosures where protected in accordance with 300.5(D).~~

~~(B) Branch Circuits or Feeders.~~

~~(1) Grounded Conductor Insulated. Type SE service-entrance cables shall be permitted in wiring systems where all of the circuit conductors of the cable are of the rubber-covered or thermoplastic type.~~

~~(2) Grounded Conductor Not Insulated. Type SE service-entrance cable shall be permitted for use where the insulated conductors are used for circuit wiring and the uninsulated conductor is used only for equipment grounding purposes.~~

~~Exception: Uninsulated conductors shall be permitted as a grounded conductor in accordance with 250.140.~~

~~(3) Temperature Limitations. Type SE service-entrance cable used to supply appliances shall not be subject to conductor temperatures in excess of the temperature specified for the type of insulation involved.~~

~~(4) Installation Methods for Branch Circuits and Feeders.~~

~~(a) Interior Installations. In addition to the provisions of this article, Type SE service-entrance cable used for interior wiring shall comply with the installation requirements of Parts I and II of Article 334, excluding 334.80.~~

~~FPN:See 310.10 for temperature limitation of conductors.~~

~~(b) Exterior Installations. In addition to the provisions of this article, service-entrance cable used for feeders or branch circuits, where installed as exterior wiring, shall be installed as required by Article 225. The cable shall be supported in accordance with 334.30, unless used as messenger-supported wiring as allowed by Article 396.~~

~~Type USE cable shall be installed outside in accordance with the provisions of Article 340. Type USE shall be permitted to be terminated in enclosures at an indoor location where Type USE cable emerges from the ground. The length of the cable extending indoors to the first termination box shall not exceed 1.8 m (6 ft). Where Type USE cable emerges from the ground at terminations, it shall be protected in accordance with 300.5(D). Multiconductor service-entrance cable shall be permitted to be installed as messenger-supported wiring in accordance with Articles 225 and 396.~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Not Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-8.

GOTHAM: See my Explanation of Negative on Proposal 7-8.

SCHUMACHER: The uses permitted is a quick reference to what the cable can be used for, and is totally separate from uses not permitted. While there may be certain areas where the task group can streamline the uses permitted to make it more economical, using a "shotgun" approach to this will only make the code more confusing to the people in the field.

This particular cable needs the uses permitted, because there are two different types of cables here, type USF, and type SE, and this section makes it clear exactly what each type is to be used for.
STEWART: See my Explanation of Negative for Proposal 7-8.

7-181 Log #2210 NEC-P07 (338-10) **Final Action: Reject**

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
338.10 Uses Permitted.
(A) Service-Entrance Conductors. Service-entrance cable used as service-entrance conductors shall be installed as required by Article 230. Type USE used for service laterals shall be permitted to emerge from the ground outside at terminations in meter bases or other enclosures where protected in accordance with 300.5(D).
(B) Branch Circuits or Feeders.
(1) ~~Grounded~~ Earth Conductor Insulated. Type SE service entrance cables shall be permitted in wiring systems where all of the circuit conductors of the cable are of the rubber covered or thermoplastic type.
(2) ~~Grounded~~ Earth Conductor Not Insulated. Type SE service-entrance cable shall be permitted for use where the insulated conductors are used for circuit wiring and the uninsulated conductor is used only for equipment grounding purposes.
Exception: Uninsulated conductors shall be permitted as a ~~grounded~~ earth conductor in accordance with 250.140.
(3) Temperature Limitations. Type SE service-entrance cable used to supply appliances shall not be subject to conductor temperatures in excess of the temperature specified for the type of insulation involved.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The term "grounded" has been universally accepted within the NEC for many years, and changing to "earthing" will not enhance the clarity of the Code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-182 Log #3416 NEC-P07 (338-10) **Final Action: Reject**

Submitter: Christopher Clapp, Constitution Electric Corp

Recommendation:

Add new text to read as follows:
Type USE. Cable shall be permitted to be used as a service entrance cable for the meter socket to the weathershead as long as it is physically protected in a raceway.

Substantiation:

It has recently come to our attention that the practice of piping USE cable up the side of a structure is not permitted by the code. The cable is sunlight resistant and should be allowed for this application.

Panel Meeting Action: Reject

Panel Statement:

The UL Electrical Construction Equipment Directory states: "Types USE and USE-2 are not suitable for use in premises or above ground except to terminate at the service equipment or metering equipment."

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-179 Log #1426 NEC-P07 **Final Action: Reject**
(338-10 and 338.80)

Submitter: David A. Kerr, Jr. Friendsville, PA

Recommendation:

Delete 338.10(B)(4) final words ~~excluding 334.80~~.
338.80 Ampacity. The ampacity shall be determined by 310.15. Type SE service-entrance cable installed in more than 2 feet of thermal insulation shall have its ampacity limited to that of 60°C (140°F) conductors.

Substantiation:

The present reference to Article 334 is confusing. There should be a section 80 for ampacity as for other wires. I have tried to copy 320.80 for Type AC which is a clear, simple rule. There have been reports of Type SE turning to charcoal when used at its 75°C ampacity. The two foot limitation is my own invention.

Panel Meeting Action: Reject

Panel Statement:

No technical substantiation was submitted to justify this change.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-183 Log #519 NEC-P07 **Final Action: Accept in Part**
(338-10(A))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(A) Service-Entrance Conductors. Service-entrance cable used as service-entrance conductors shall be installed ~~as required by~~ in accordance with 230.6, 230.7, and Parts II, III, IV, and VIII of Article 230.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept in Part

In the recommended text, delete "VIII." The remainder of the proposal is Accepted.

Panel Statement:

The panel understands that the action on this proposal will be superceded by the action on Proposal 7-180.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-184 Log #520 NEC-P07 **Final Action: Accept**
(338-10(A))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(A) Service-Entrance Conductors. Service-entrance cable shall be permitted to be used as service-entrance conductors ~~shall be installed as required by Article 230~~.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."
90.3 states that Chapters 1, 2, 3, and 4 apply generally.

Panel Meeting Action: Accept

Panel Statement:

The panel understands that the action on this proposal will be superceded by the action on Proposal 7-180.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-185 Log #3324 NEC-P07 **Final Action: Reject**
(338-10(A))

Submitter: Steven Clapp, Consitution Electric

Recommendation:

Revise second paragragh to read as follows:
Type use used for service laterals shall be permitted to emerge from the ground outside at termination in meter bases or other enclosures and shall be permitted to extend from the point of attachment on a structure to the meter base where protected in accordance with 300.5(D).

Substantiation:

Type use triplex has a moisture resistant outer covering and has a sun light resistant covering, making it a better choice as a service entrance conductor. These same conductors are presently allowed on riser pole above the 10 ft height, sometimes unprotected or covered.

Panel Meeting Action: Reject

Panel Statement:

The UL Electrical Construction Equipment Directory states: "Types USE and USE-2 are not suitable for use in premises or above ground except to terminate at the service equipment or metering equipment."

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-186 Log #1816 NEC-P07 **Final Action: Accept**
(338-10(B)(2) Exception)

Submitter: Gilbert L. Thompson, MEIA Codes and Standards

Recommendation:

Remove the period at the end of the sentence and add a comma instead. Add the following after the comma:
250.32 and 225.30 through 225.40.

Substantiation:

Service cable has been used as feeders to serve more than one building on the same property for years without any problems. If the cable is installed to a readily accessible disconnecting means that is located nearest to the point of entry in each building, is properly grounded, and the conductors are provided with proper over current protection, then it cannot be more dangerous than the service feeding the building, even though it is considered a feeder to the other building. When the Code Making Panel required all ungrounded conductors of branch circuits and feeders to be insulated, it limited its use. There ought to be an added exception to allow its use if properly installed as a feeder to other buildings.

Panel Meeting Action: Accept

Panel Statement:

The panel understands that the action on this proposal will be superceded by the action on Proposal 7-180.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-187 Log #3249 NEC-P07 **Final Action: Reject**
(338-10(B)(4), FPN (New))

Submitter: Joe Zsebe, City of Cudahy, WI

Recommendation:

Add a fine print note to read as follows:
FPN: See 230.51(A).

Substantiation:

To let users be aware of special strapping for SE cable used as exterior service entrances.

Panel Meeting Action: Reject

Panel Statement:

230.51(A) already applies, and need not be repeated in this section.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-188 Log #3173 NEC-P07 **Final Action: Reject**
(338-10(B)(4)(a))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass Electrical Code Adv. Committee

Recommendation:

Delete the phrase "excluding 334.80".

Substantiation:

This is a companion proposal to the one submitted on 334.80. If that proposal is accepted, then the exclusion of 334.80 serves no purpose, since the wording proposed for Type NM cable is technically correct for any cabled wiring method from type AC cable (where it is already in place) to this method and others. Furthermore, the current NEC blanket exclusion of applicability of 334.80 means the only code rule standing between this product and thermal insulation is 310.10. That section is so broadly written that few know how to apply it in this case.

It is important to recognize Type SE cable was the very wiring method that failed in the tests run to substantiate the merits of 334.80. Those tests, for example, resulted in the literal incineration of the conductor insulation and cable jacket of 2 AWG AL Type SE cable embedded in cellulose thermal insulation while drawing current at its nominal Table 310.16 ampacity. The problem is compounded in large cables because people run large cables in the expectation of drawing large amounts of current. Due to the I^2R relationship, high current values (taken to the second power) quickly overwhelm the favorable effects of lower cable resistance (a first power factor). Running this type of cable embedded in thermal insulation without massive derating (well beyond 90°C to 60°C) is an extreme safety hazard.

Panel Meeting Action: Reject

Panel Statement:

Inadequate technical substantiation was provided to justify this change.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

STRANIERO: The panel rejected this proposal citing that inadequate technical substantiation was provided. The substantiation submitted with the proposal simply states that thermal degradation of electrical cable results from the installation of cables where they will be subject to installation in thermal insulation. The panel statement does not address the submitter's proposal or substantiation. The same thermal degradation that applies to NM, UF, and AC cable when installed in thermal insulation applies to any other wiring method installed in thermal insulation where heat dissipation is impeded. The panel should provide technical substantiation on why Type SE cable should be exempted from the ampacity requirements of Types NM, UF, and AC cables when SE cable is installed under the identical condition of in thermal insulation.

7-189 Log #3203 NEC-P07 **Final Action: Reject**
(338-10(B)(4)(a) (New))

Submitter: Larry G. Watkins, Alcan Cable

Recommendation:

Add the following text to the end of 338.10(B)(4)(a):
Type SE service-entrance cable where used as a feeder is permitted to be installed as open runs in dropped or suspended ceilings in one or two family dwellings, multifamily dwellings, and other structures of Types III, IV and V.

Substantiation:

NM is not service cable and requirement 334.12(A)(1) is being applied to Type SE cable unintentionally as a result of the changes made in Article 334 during the appeals process for the 2002 NEC. In accordance to codes prior to 2002, Type SE was used as a feeder without being effected by the restrictions in 334.12(A)(1). Requirements in 334 were added after the appeals process. The panel had no knowledge of the unintended consequence for applications of SE cable.

Panel Meeting Action: Reject

Panel Statement:

When SE cable is installed as interior wiring, it must comply with the requirements for Type NM cable.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-190 Log #521 NEC-P07 **Final Action: Accept in Part**
(338-10(B)(4)(b))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(b) Exterior Installations. In addition to the provisions of this article, service-entrance cable used for feeders or branch circuits, where installed as exterior wiring, shall be installed in accordance with Parts I and III of ~~as required by~~ Article 225. The cable shall be supported in accordance with 334.30, unless used as messenger-supported wiring as permitted in ~~allowed by~~ Part II of Article 396.
Type USE cable installed as underground feeder and branch circuit cable shall comply with Part II ~~shall be installed outside in accordance with the provisions~~ of Article 340. Type USE shall be permitted to be terminated in enclosures at an indoor location where Type USE cable emerges from the ground. The length of the cable extending indoors to the first termination box shall not exceed 1.8 m (6 ft). Where Type USE cable emerges from the ground at terminations, it shall be protected in accordance with 300.5(D).
Multiconductor-service entrance cable shall be permitted to be installed as messenger-supported wiring in accordance with 225.10 ~~Article 225~~ and Part II of Article 396.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept in Part

In the recommended text, revise first sentence of (b) to read as follows:
"...in accordance with Part I of Article 225."
The remainder of the proposal is Accepted.

Panel Statement:

The panel understands that the action on this proposal will be superceded by the panel action on Proposals 7-180 and 7-194.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-191 Log #1345 NEC-P07 **Final Action: Accept**
(338-10(B)(4)(b))

Submitter: Robert R. Sallaz, City of Munroe Falls, OH

Recommendation:

Delete the fourth and fifth sentence:
~~Type USE shall be permitted to be terminated in an indoor location where types USE cable emerges from the ground. The length of the cable extending indoors to the first termination box shall not exceed 1.8 m (6 ft).~~

Substantiation:

According to the Report on Proposals, the technical substantiation for this code change was "some inspector's in Pennsylvania are already permitting this." Violating the Code is not a reason to change it. This should have been sent to Code-Making Panel 6 for review. Had they done so, they would have clarified use does not have a fire retardant covering and as such has never been permitted to be installed indoors. 338.2 still contains the information that type USE is identified for underground use and does not have a flame-retardant covering.
Please correct this code section and have the Technical Correlating Committee review the actions of Code-Making Panel 7 on this issue. I shudder to think of anyone - even Pennsylvanians - going to sleep with Type USE terminated inside their 90 octane-rated paneled walls.

Panel Meeting Action: Accept

Panel Statement:

Comment 7-101 to reject Proposal 7-209 was accepted in the 2002 Code cycle which would delete the text as requested in the proposal. Deletion of these two sentences was included in the December 2002 NEC Errata.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-192 Log #2109 NEC-P07 **Final Action: Accept in Principle**
(338-10(B)(4)(b))

Submitter: David A. Kerr, Jr. Friendsville, PA

Recommendation:

Delete all reference to Type USE permitted to be used indoors.

Substantiation:

The Code-Making Panel accepted ROP 7-209. It then reversed itself by accepting ROC 7-101. Type USE should not be used indoors because it burns very well. There is no shortage of multiple-LABELED USE/RHH/RHW which will not burn. The difference is price, for example 76 cents versus $1.22. Type USE is absolutely not suitable for trailer feeders because it is not color coded.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 7-191.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-193 Log #2898 NEC-P07 **Final Action: Accept**
(338-10(B)(4)(b))

Submitter: Larry G. Watkins, Alcan Cable

Recommendation:

Revise text to read as follows:

(b) Exterior Installations. In addition to the provisions of this article, service-entrance cable used for feeders or branch circuits, where installed as exterior wiring, shall be installed as required by Article 225. The cable shall be supported in accordance with 334.30, unless used as messenger-supported wiring as allowed by Article 396.

Type USE cable shall be installed outside in accordance with the provisions of Article 340. ~~Type USE shall be permitted to be terminated in enclosures at an indoor location where type USE cable emerges from the ground. The length of the cable extending indoors to the first termination box shall not exceed 1.8 m (6 ft).~~

Where Type USE cable emerges from the ground at terminations, it shall be protected in accordance with 300.5(D). Multiconductor service-entrance cable shall be permitted to be installed as messenger-supported wiring in accordance with Articles 225 and 396.

Substantiation:

Panel 7 action on Comment 7-101(May 2001 ROC) amended the Panel action on comment 7-96. However, this was not reflected when the 2002 NEC was published.

Panel Meeting Action: Accept

Panel Statement:

Comment 7-101 to reject Proposal 7-209 was accepted in the 2002 Code cycle which would delete the text as requested in the proposal. Deletion of these two sentences was included in the December 2002 NEC Errata.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-194 Log #2022 NEC-P07 (338-12) **Final Action: Accept in Principle in Part**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Add text to read as follows:

338.12 Uses Not Permitted. Type SE and USE cable shall not be used under the following conditions or in the following locations:

SE Cable –

(1) For branch circuit and feeder wiring unless all of the circuit conductors are of the rubber-covered or thermoplastic type.

(2) For interior branch circuit and feeder wiring unless the installation complies with the requirements of parts I and II of Article 334.

FPN: See 310.10 for temperature limitation of conductors

(3) For exterior branch circuit and feeder wiring unless the installation complies with the provisions of Article 225 and is supported in accordance with 334.30, unless used as messenger-supported wiring as allowed by Article 396.

(4) Where the uninsulated conductor is used as a grounded conductor except as permitted by 250.140

(5) Where subject to physical damage except as permitted by 230.50(A).

(6) For supply to appliances where the SE cable is subjected to conductor temperatures in excess of the temperature specified for the type of insulation involved.

USE Cable –

(1) For interior wiring including service, feeder, and branch circuit wiring.

(2) For exterior feeders and branch circuits unless the installation complies with the requirements of Article 340.

(3) For above ground installations except where USE cable terminates in an enclosure at an outdoor location where the cable emerges from the ground.

(4) Above ground unless protected in accordance with 300.5(D).

(5) As a multiconductor aerial cable unless supported by a messenger in accordance with Articles 225 and 396.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept in Principle in Part

Revise the recommended wording to read as follows:

" 338.12 Uses Not Permitted. Type SE and USE cable shall not be used under the following conditions or in the following locations:

(A) SE Cable

(1) Where subject to physical damage unless protected in accordance with 230.50(A).

(2) For underground use unless identified for the purpose.

(3) Branch Circuits and Feeders

a. For branch circuit and feeder wiring unless all of the circuit conductors are insulated.

b. For interior branch circuit and feeder wiring unless the installation complies with the requirements of Part II of Article 334, excluding 334.80.

c. For exterior branch circuit and feeder wiring unless the installation complies with the provisions of Part I of Article 225 and is supported in accordance with 334.30, unless used as messenger supported wiring as allowed by Part II of Article 396.

d. Where the uninsulated conductor is used as a grounded conductor except as permitted by 250.140

(B) USE Cable

(1) For interior wiring
(2) For exterior feeders and branch circuits unless the installation complies with the requirements of Part II of Article 340.
(3) For above ground installations except where USE cable terminates in an enclosure at an outdoor location where the cable emerges from the ground.
(4) Above ground unless protected in accordance with 300.5(D).
(5) As aerial cable unless it is a multiconductor cable installed as messenger supported wiring in accordance with 225.10 and Part II of Article 396."

Panel Statement:

2.1.5.2 of the NEC Style Manual requires that first and second level subdivisions shall have titles.
In (A)(3)b., Part I of Article 334 is not applicable to SE cable and 310.10 already applies.
In (A)(1), 230.50(A) specifies the protection required, not permitted uses.
In (B)(1), Type USE is not permitted for any type of interior wiring.
In (B)(2), Part II of Article 340 addresses the installation requirements for exterior feeders and branch circuits.
4.4.1 of the NEC Style Manual does not permit references to entire Articles.
In (A)(2) SE cable is not listed for use underground.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-12.
SCHUMACHER: This should be rejected. See my Explanation of Negative Vote on Proposal 7-180.
STEWART: See my Explanation of Negative for Proposal 7-8.

7-195 Log #1362 NEC-P07 **Final Action: Reject**
(339 (New))

Submitter: David Sroka Turner Falls, MA

Recommendation:

Add a new Article 339:
"Two-Hour, Fire-Rated Rubber Insulated Cable: Type RHH."

Substantiation:

This is obviously a critical use cable, rapidly gaining in popularity. Usage requirements should be spelled out same as MI. I recommend EMT use be discontinued.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not provided any text for a new Article. Such a requirement should appear in Chapters 5, 6, or 7. Such a requirement is not necessary for general wiring.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-196 Log #2939 NEC-P07 **Final Action: Reject**
(340-6 (New))

Submitter: Martin J. Brett, Jr.

Recommendation:

Revise text as follows:
340.6 Listing Requirements. Types UF cable shall be listed.

Substantiation:

As the supply chain becomes more global and the acceptance of the NEC grows internationally, it is important to clearly state the intent to require a listed product. Also, with the introduction of the common numbering system last cycle, xxx.6 was reserved for "Listing Requirements". Without a entry for 340.6 in this renumbered article, it could be assumed that these products do not need to be listed. The objective is to guarantee that Types SE and USE cables installed in accordance with this article meet a minimum standard of performance for safety. The intent is that this product be evaluated and listed in accordance with the appropriate product standard.

Panel Meeting Action: Reject

Panel Statement:

There are several methods of approving products. One method should not be defined to the exclusion of the others.
Substantiation has not been provided to indicate that there is a problem with the current products. Standard products are listed, however, products designed for special applications or conditions may not fit the listing criteria. This change would limit the discretion of the Authority Having Jurisdiction to use means other than a listing to determine acceptability for special circumstances.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-7.
CANGEMI: See my Explanation of Negative on Proposal 7-7.
SCHUMACHER: Even though it is required that products be listed in other parts of the code, this would make it perfectly clear that this product must be listed to meet the standards of this code.
STEWART: See my Explanation of Negative for Proposal 7-7.

7-197 Log #2041 NEC-P07 (340-10) **Final Action: Accept**

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the text in 340.10 as follows:

~~340.10 Uses Permitted.~~

~~Type UF cable shall be permitted as follows:~~

~~(1) For use underground, including direct burial in the earth. For underground requirements, see 300.5.~~

~~(2) As single-conductor cables. Where installed as single-conductor cables, all conductors of the feeder grounded conductor or branch circuit, including the grounded conductor and equipment grounding conductor, if any, shall be installed in accordance with 300.3.~~

~~(3) For wiring in wet, dry, or corrosive locations under the recognized wiring methods of this Code.~~

~~(4) Installed as nonmetallic-sheathed cable. Where so installed, the installation and conductor requirements shall comply with the provisions of Article 334 and shall be of the multiconductor type.~~

~~(5) For solar photovoltaic systems in accordance with 690.31.~~

~~(6) As single-conductor cables as the nonheating leads for heating cables as provided in 424.43.~~

~~(7) Supported by cable trays. Type UF cable supported by cable trays shall be of the multiconductor type.~~

~~FPN:See 310.10 for temperature limitation of conductors.~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Not Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 11 Negative: 4

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-8.

GOTHAM: See my Explanation of Negative on Proposal 7-8.

SCHUMACHER: The uses permitted is a quick reference to what the cable can be used for, and is totally separate from uses not permitted. While there may be certain areas where the task group can streamline the uses permitted to make it more economical, using a "shotgun" approach to this will only make the code more confusing to the people in the field.

STEWART: See my Explanation of Negative for Proposal 7-8.

7-198 Log #2211 NEC-P07 **Final Action: Reject**
(340-10)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
340.10 Uses Permitted. Type UF cable shall be permitted as follows:
(1) For use underground, including direct burial in the earth. For underground requirements, see 300.5.
(2) As single-conductor cables. Where installed as single conductor cables, all conductors of the feeder ~~grounded~~ earth conductor or branch circuit, including the ~~grounded~~ earth conductor and equipment grounding conductor, if any, shall be installed in accordance with 300.3.
(3) For wiring in wet, dry, or corrosive locations under the recognized wiring methods of this Code.
(4) Installed as nonmetallic-sheathed cable. Where so installed, the installation and conductor requirements shall comply with the provisions of Article 334 and shall be of the multi conductor type.
(5) For solar photovoltaic systems in accordance with 690.31.
(6) As single-conductor cables as the non heating leads for heating cables as provided in 424.43.
(7) Supported by cable trays. Type UF cable supported by cable trays shall be of the multi conductor type.
FPN: See 310.10 for temperature limitation of conductors.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The term "grounded" has been universally accepted within the NEC for many years, and changing to "earthing" will not enhance the clarity of the Code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-199 Log #1890 NEC-P07 **Final Action: Reject**
(340-10(2))

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
(2) As single-conductor cables. Where installed as single-conductor cables, all conductors of the feeder grounded conductor or branch circuit, including the grounded conductor and equipment ~~grounding~~ bonding conductor, if any, shall be installed in accordance with 300.3.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

The Panel agrees that there is confusion in the field surrounding these two terms and supports the concept of this change. However, the decision to use the terms "grounding" or "bonding" is the responsibility of Code-Making Panel 5. Code-Making Panel 7 requests that the Technical Correlating Committee appoint a Task Group to study the impact of such a change. Code-Making Panel 7 requests the opportunity to review any changes of these terms that are under their purview.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

STRANIERO: See my Comment on Affirmative on Proposal 7-1.

7-200 Log #272 NEC-P07 **Final Action: Accept in Principle**
(340-10(4))

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
(4) Installed as nonmetallic-sheathed cable. Where so installed, the installation and conductor requirements shall comply with the provisions of Parts II and III of Article 334 and shall be of the multiconductor type.

Substantiation:

In accordance with 4.1.1 of the NEC Style Manual.

Panel Meeting Action: Accept in Principle

Panel Statement:

See panel action and statement on Proposal 7-201.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-201 Log #522 NEC-P07 **Final Action: Accept**
(340-10(4))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(4) Installed as nonmetallic-sheathed cable. Where so installed, the installation and conductor requirements shall comply with ~~the provisions~~ Parts II and III of Article 334 and shall be of the multiconductor type.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept

Panel Statement:

The panel understands that the action on this proposal is superceded by the actions on Proposals 7-197 and 7-203.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-202 Log #2113 NEC-P07 **Final Action: Accept in Part**
(340-10(4))

Submitter: James L. VonBerg, II Saginaw, MI

Recommendation:

In the second line delete the words ~~and conductor requirements~~, and add Part II after the reference to Article 334. The paragraph will read as follows:
(4) Installed as nonmetallic-sheathed cable. Where so installed, the installation ~~and conductor requirements~~ shall be of the multiconductor type.

Substantiation:

This proposal is intended to be considered simultaneously with another proposal adding the conductor insulation requirements to 340.112.
A general reference to Article 334 creates confusion as there are duplicate cable construction requirements to those in Article 340 that are in conflict. Just simply reference the installation requirements of Part II and add the 90°C insulation requirement to 340.112.

Panel Meeting Action: Accept in Part

In the recommended text, the panel Accepts the addition of "Part II", and Rejects the deletion of "and conductor requirements" in two places.

Panel Statement:

334.104 limits the maximum conductor size to 2 AWG. See Panel Action on Proposal 7-203.
The panel understands that the action on this proposal is superceded by the actions on Proposals 7-197 and 7-203.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-203 Log #2023 NEC-P07 (340-12) **Final Action: Accept in Principle in Part**

TCC Action:

The Technical Correlating Committee understands that the panel action on Proposal 7-204 further modifies 340.12(13) in this Proposal.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Add text to read as follows:

340.12 Uses Not Permitted. Type UF cable shall not be used under the following conditions or in the following locations:

(1) As a substitute wiring method for NM Cable unless the cable is of the multiconductor type and the installation and conductor requirements comply with the provisions of Article 334.

(2) For cable tray installations unless the cable is of the multiconductor type.

(3) As service-entrance cable.

(4) In commercial garages.

(5) In theaters and similar locations.

(6) In motion picture studios.

(7) In storage battery rooms.

(8) In hoistways, or on elevators or escalators.

(9) In hazardous (classified) locations.

(10) Embedded in poured cement, concrete, or aggregate, except where embedded in plaster as nonheating leads where permitted in 424.43.

(11) Where exposed to direct rays of the sun, unless identified as sunlight resistant.

(12) Where subject to physical damage.

(13) As overhead cable, except where installed as messenger-supported wiring in accordance with Article 396.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Accept in Principle in Part

In the recommended text, revise (1) to read:

"...comply with Parts II and III of Article 334."

Revise (2) to read:

"...multiconductor type identified for the use."

Revise (13) to read:

"...in accordance with Part II of Article 396."

The panel accepts the remainder of the proposal.

Panel Statement:

334.104 limits the maximum conductor size to 2 AWG.

(2) was revised because not all multiconductor types are suitable for the purpose.

(1) and (13) were revised to comply with 4.4.1 of the NEC Style Manual.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

BROWN: See my Explanation of Negative on Proposal 7-12.
SCHUMACHER: This should be rejected. See my Explanation of Negative Vote on Proposal 7-197.
STEWART: See my Explanation of Negative for Proposal 7-8.

7-204 Log #523 NEC-P07 **Final Action: Accept in Part**
(340-12(11))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(11) As overhead cable, except where installed as messenger-supported wiring ~~in accordance with~~ as permitted in Part II of Article 396.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept in Part

In the Recommendation, the panel Accepts the addition of "Part II of".
The panel does not accept the remainder of the Proposal.
The panel notes that due to the action taken on Proposal 7-203, list item (11) will become list item (13).

Panel Statement:

See panel action and statement on Proposal 7-203.
The existing phrase is more accurate than that proposed. Part II of Article 396 addresses both uses permitted and installation requirements.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-205 Log #684 NEC-P07 **Final Action: Reject**
(340-12(2)(7))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text to read as follows:
(2) In commercial garages having hazardous (classified) locations as defined in 511.3
(7) In hazardous (classified) locations except where permitted in the following:
a. 501.4(B)(3)
b. 502.4(B)(3)
c. 504

Substantiation:

For consistency, this section should correlate with 334.12. Although article 334 applies where Type UF cable is installed as NMSC this section repeats most of the non permitted uses of NMSC, and differences can cause confusion for Code users.

Panel Meeting Action: Reject

Panel Statement:

Type UF cable is not permitted in hazardous locations nor in commercial garages with or without hazardous locations. No technical substantiation was provided to support this expanded use.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

7-206 Log #2114 NEC-P07 (340-112) **Final Action: Accept in Principle**

Submitter: James L. VonBerg, II Saginaw, MI

Recommendation:

Add a new last sentence to this section stating the 90°C insulation requirement. The new last sentence will read as follows:
When installed as a nonmetallic-sheathed cable, conductor insulation shall be rated at 90°C (194°F).

Substantiation:

This proposal is intended to be considered simultaneously with another proposal referencing Article 334 Part II for installation requirements.

The only construction specification in Article 334 that is needed is the one requiring conductor insulation to be 90°C rated when installed as a nonmetallic-sheathed cable. The general reference to the entire Article 334 creates confusion about cable construction requirements. By making reference to the 90°C insulation requirement for the case when UF cable is installed as a nonmetallic sheathed cable will make it more obvious that the 60°C insulation requirement only applies when installed as an underground cable.

Panel Meeting Action: Accept in Principle

Add a new last sentence to existing 340.112 to read as follows:
"Where installed as a substitute wiring method for NM cable, the conductor insulation shall be rated 90°C (194°F)."

Panel Statement:

The revised language meets the intent of the submitter, and correlates with 340.12(1) in Proposal 7-203.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Sequence Number 7-207 is not used.

8-7 Log #1891 NEC-P08 (342-2) **Final Action: Reject**

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
342.2 Definition. Intermediate Metal Conduit (IMC). A steel threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment ~~grounding~~ bonding conductor when installed with its integral or associated coupling and appropriate fittings.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-8 Log #581 NEC-P08 **Final Action: Accept**
(342-22)

TCC Action:

The Technical Correlating Committee directs that this proposal be referred to Code-Making Panel 7 for information.

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
342.22 Number of Conductors. The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is ~~permitted~~ not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

The second paragraph of this section was added for the 2002 NEC. The substantiation for adding this provision was that..."The proposed language clarifies that cables, where permitted elsewhere in the Code, are allowed to be used in a raceway." Cable Articles are structured so that installation in raceways is not prohibited. The proposed revision will correlate the desired clarification with the cable articles, which do not specifically permit installation in raceways but instead do not prohibit installation in raceways.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: This proposal should be Rejected until it has been demonstrated to this panel that the panels overseeing each cable type have been made aware that, unless they specifically prohibit the installation of cable, it will be permitted.

8-9 Log #1199 NEC-P08 **Final Action: Accept**
(342-22)

TCC Action:

The Technical Correlating Committee directs that this proposal be referred to Code-Making Panel 7 for information.

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
342.22 Number of Conductors.
The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9. Cables shall be permitted to be installed where such use is not prohibited ~~permitted~~ by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

This change agrees with the panel's intent and substantiation for placing this language in the 2002 code. It was the panel's intent to allow cables in raceways unless prohibited in the respective cable article.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-10 Log #1241 NEC-P08 (342-24) **Final Action: Accept in Principle**

TCC Action:

The Technical Correlating Committee advises that assignment of Tables in Chapter 9 is the responsibility of the Technical Correlating Committee and the Technical Correlating Committee "Accepts" the Panel Action.

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

342.24 Bends — How Made. Bends of IMC shall be made so that the conduit will not be damaged and so that the internal diameter of the conduit will not be effectively reduced. The radius of the curve of any field bend to the centerline of the conduit shall not be less than indicated in Table 300.18(C) ~~344.24~~.

Substantiation:

This is a companion proposal to move Table 344.24 from Article 344 to Article 300. All raceway Articles refer to this table for the radius of conduit or tubing bends. It is appropriate that this table belongs in this general section.

Panel Meeting Action: Accept in Principle

In the submitter's recommendation, change the reference "Table 300.18(C)" to "Table 2, Chapter 9."

Panel Statement:

The panel agrees that the table should appear in a more general location. Relocating the table to Chapter 9 will allow retention of the table under the purview of CMP 8.

CMP 8 recommends that the TCC review the placement (number) of the table in Chapter 9 for consistency in the overall Code organization and panel scope.

Refer to Proposal 8-24a (Log #CP800).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: There was absolutely no substantiation for changing this section of the code. I disagree that placing this table in Chapter 9 will make the code more user friendly. Relocating the table to Chapter 9 will be more difficult to find as evidenced by the fact that the expansion tables in Article 347 (352) were relocated to Chapter 9 then returned to Chapter 3 for usability. This table was originally developed for minimum bending radii of rigid metal conduit and it should remain in Article 344. It is referenced in other articles to minimize redundancy. It is an important reference for persons bending conduit and tubing by hand. Table 344.24 should be retained in Chapter 3, please reject this proposal.

8-11 Log #1065 NEC-P08 (342-26) **Final Action: Reject**

Submitter: James Tente, International Code Consultants and Inspections

Recommendation:

Delete text as follows:

Bends - Number in one run. There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, ~~for sample, conduit bodies and boxes.~~

Substantiation:

Current language limits the maximum bend allowance to runs between conduit bodies and boxes only, and may be interrupted as permitting more than 360° of bends between other Chapter 3 wiring methods.

Panel Meeting Action: Reject

Panel Statement:

The current text is clear. Conduit bodies and boxes are only an example.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-12 Log #524 NEC-P08 **Final Action: Accept**
(342-30)

TCC Action:

It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting. This action will be considered by the panel as a public comment.

Submitter: James M. Daly, General Cable

Recommendation:

Delete text as follows:
IMC shall be installed as a complete system ~~as provided in Article 300~~ and shall be securely fastened in place and supported in accordance with 342.30(A) and (B).

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."
90.3 states that Chapters 1, 2, 3, and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: This proposal should be rejected or accepted in principle. This is a major change without substantiation. The reference to Article 300 is appropriate or 300.18 could be specifically referenced as it appropriately appears in 352.30 for rigid nonmetallic conduit. The present code does not require our raceways to be installed as a complete system. It only requires them to be installed complete between outlet, junction, or splicing points prior to the installation of conductors. This is appropriate since it is not uncommon for only portions of the conduit system being installed and wire pulled. Conditions on the job site can prevent or hinder the installers ability to efficiently install to entire system before pulling wire. Please reject this proposal as it is written.

8-13 Log #1096 NEC-P08 **Final Action: Reject**
(342-30 (New))

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence.
All support straps, clips, hangers, and similar support hardware shall be identified for the purpose.

Substantiation:

Conduit straps, clips, hangers may not be considered "fittings".
According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

Supporting and securing can be achieved in many ways, and standard hardware items are generally acceptable. To require each of these items to be identified for each purpose is overly restrictive. There is insufficient substantiation for this change.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-14 Log #1242 NEC-P08 **Final Action: Accept**
(342-30)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
342.30 Securing and Supporting. IMC shall be installed as a complete system ~~as provided in Article 300~~ and shall be securely fastened in place and supported in accordance with 342.30(A) and (B).

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ‘‘grounded in accordance with Article 250’’ unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-15 Log #967 NEC-P08 **Final Action: Reject**
(342-30(B)(5))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add text to read as follows:
(5) Conduit shall be permitted to be fished through shallow crawlspaces without securing except as required by Section 342.30(A), provided the conduit is made up with threaded couplings, and it rests either on a basically continuous surface or on structural members spaced no further apart than permitted by Table 344.30(B)(2).

Substantiation:

As presently worded, it not clear, and hence inconsistently permitted that support can consist of anything other than being secured or passing through a hole. It specifically is quite unclear that fishing is permitted, and that resting on the ground, for example, can be used as a means of support. In other articles where fishing is permitted, it tends to be explicitly mentioned. Consider IMC run under an existing, low-to-the-ground deck. This corresponds to a proposal for Section 300.11.

Panel Meeting Action: Reject

Panel Statement:

The submitter's concerns of being able to "fish" are already permitted by 342.30(A) and 342.30(B)(2). The proposed additional text does not add clarity.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-16 Log #2866 NEC-P08 **Final Action: Accept in Principle**
(342-30(B)(3))

Submitter: Wayne A. Lilly Bridgewater, VA

Recommendation:

Revise Section 342.30(B)(3) so as to read as follows:
(3) Exposed vertical risers from industrial machinery or fixed equipment shall be permitted to be supported at intervals not exceeding 6 m (20 ft), if the conduit is made up with threaded couplings, the conduit is ~~firmly supported~~ securely fastened at the top and bottom of the riser, and no other means of intermediate support is readily available.

Substantiation:

Panel 8 is to be commended for clearly distinguishing between the concepts of securing and supporting as they apply to circular raceways. Part of the results are including both securing and supporting in the title of 342.30 and establishing separate sections within that section to address the unique requirements associated with both. As a part of the ongoing process of separating and clearly distinguishing between the two, a change in wording should be made in 342.30(B)(3). The concept of supporting the raceway at the top and bottom would still permit the raceway to move when subjected to force. This movement could damage the termination integrity or loosen couplings. Changing the wording to securely fastened will require that the raceway be secured so that the potential for damage from movement is greatly reduced.

Panel Meeting Action: Accept in Principle

Revise the submitters's recommendation to retain the word "supported" and add the word "and" so that the recommendation reads:

Revise 342.30(B)(3) to read as follows:
(3) Exposed vertical risers from industrial machinery or fixed equipment shall be permitted to be supported at intervals not exceeding 6 m (20 ft), if the conduit is made up with threaded couplings, the conduit is supported and securely fastened at the top and bottom of the riser, and no other means of intermediate support is readily available.

Panel Statement:

It is important to support and secure vertical runs at both the bottom and top of the run.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-17 Log #349 NEC-P08 **Final Action: Reject**
(342-30(B)(4))

Submitter: Glenn W. Zieseniss Crown Point, IN

Recommendation:

Revise text to read:
(4) Horizontal runs of IMC supported by openings which horizontal opening is not larger than 3 times the nominal inside diamter of the raceway through framing members at intervals not exceeding 3 m (10 ft) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.

Substantiation:

Some openings may be more than 10 feet in width. I have seen several installations where the raceways looked like snakes between termination points in the roof trusses. The 3 times the nominal ID of the raceway of the opening in the framing members would constrain the raceway to an appearance as required by NEC 110.12 (1st sentence). Workers installing other items or equipment can easily deflect the raceway either purposely or accidentally while doing their work. Painters or persons installing advertisements may disturb the electrical raceway position. The 3 times the nominal ID would allow some minor deflections of the raceway if the framing member openings are not in a straight line.

Panel Meeting Action: Reject

Panel Statement:

Insufficient technical substantiation has been provided to support the change.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-18 Log #582 NEC-P08 **Final Action: Accept**
(342-42(A))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
(A) Threadless. Threadless couplings and connectors used with conduit shall be made tight. Where buried in masonry or concrete, they shall be the concretetight type. Where installed in wet locations, they shall comply with 314.15(A) ~~be the raintight type~~. Threadless couplings and connectors shall not be used on threaded conduit ends unless listed for the purpose.

Substantiation:

314.15(A) requires such fittings to be listed for use in wet locations. Some wet location applications might require greater or lesser degrees of protection from the ingress of moisture as allowed for in the first sentence of 314.15(A) "...so as to prevent moisture from entering or accumulating...".

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

Comment on Affirmative:

DABE: The panel may consider changing "comply with 314.15(A)" to "be listed for use in wet locations."

8-19 Log #1892 NEC-P08 **Final Action: Reject**
(342-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
342.60 Grounding. IMC shall be permitted as an equipment ~~grounding~~ bonding conductor.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-20 Log #1893 NEC-P08 (344-2) **Final Action: Reject**

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
344.2 Definition. Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment ~~grounding~~ bonding conductor when installed with its integral or associated coupling and appropriate fittings. RMC is generally made of steel (ferrous) with protective coatings or aluminum (nonferrous). Special use types are silicon bronze and stainless steel.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-21 Log #434 NEC-P08 (344-10(E)) **Final Action: Reject**

Submitter: Hugh D. Butler, Jr. Carrollton, GA

Recommendation:

Add new text as follows:
(E) Cable Tray. RMC shall be permitted to be installed in cable tray systems as provided by 392.3(A) and Table 392.3(A).

Substantiation:

To correlate with 392.3(A) and Table 392.3(A).

Panel Meeting Action: Reject

Panel Statement:

A correlation is not required between Articles 344 and 392 per 90.3. 392.3 and Table 392.3(A) indicate the wiring methods acceptable for use with cable trays.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-22 Log #583 NEC-P08 **Final Action: Accept**
(344-22)

TCC Action:

The Technical Correlating Committee directs that this proposal be referred to Code-Making Panel 7 for information.

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
344.22 Number of Conductors. The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is ~~permitted~~ not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

The second paragraph of this section was added for the 2002 NEC. The substantiation for adding this provision was that..."The proposed language clarifies that cables, where permitted elsewhere in the Code, are allowed to be used in a raceway." Cable Articles are structured so that installation in raceways is not prohibited. The proposed revision will correlate the desired clarification with the cable Articles, which do not specifically permit installation in raceways but instead do not prohibit installation in raceways.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-23 Log #1200 NEC-P08 **Final Action: Accept**
(344-22)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
344.22 Number of Conductors.
The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is not prohibited ~~permitted~~ by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

This change agrees with the panel's intent and substantiation for placing this language in the 2002 code. It was the panel's intent to allow cables in raceways unless prohibited in the respective cable article.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-24 Log #1243 NEC-P08 (344-24) **Final Action: Accept in Principle**

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
344.24 Bends — How Made.
Bends of RMC shall be made so that the conduit will not be damaged and so that the internal diameter of the conduit will not be effectively reduced. The radius of the curve of any field bend to the centerline of the conduit shall not be less than indicated in Table 300.18(C) ~~344.24~~.

~~Table 300.18(C) Radius of Conduit Bends~~

~~Conduit Size~~		~~One Shot and Full Shoe Benders~~		~~Other Bends~~			
~~Metric Designator~~	~~Trade Size~~	~~mm~~	~~in.~~	~~mm~~		~~in.~~	
~~16~~	~~1/2~~		~~101.6~~	~~4~~	~~101.6~~		~~4~~
~~21~~	~~3/4~~		~~114.3~~	~~4 1/2~~	~~127~~		~~5~~
~~27~~	~~1~~		~~146.05~~	~~5 3/4~~	~~152.4~~	~~6~~	
~~35~~	~~1 1/4~~		~~184.15~~	~~7 1/4~~	~~203.2~~	~~8~~	
~~41~~	~~1 1/2~~		~~209.55~~	~~8 1/4~~	~~254~~	~~10~~	
~~53~~	~~2~~		~~241.3~~	~~9 1/2~~	~~304.8~~	~~12~~	
~~63~~	~~2 1/2~~		~~266.7~~	~~10 1/2~~	~~381~~		~~15~~
~~78~~	~~3~~		~~330.2~~	~~13~~	~~457.2~~		~~18~~
~~91~~	~~3 1/2~~		~~381~~	~~15~~	~~533.4~~		~~21~~
~~103~~	~~4~~		~~406.4~~	~~16~~	~~609.6~~		~~24~~
~~129~~	~~5~~		~~609.6~~	~~24~~	~~762~~		~~30~~
~~155~~	~~6~~		~~762~~	~~30~~	~~914.4~~		~~36~~

Substantiation:

This is a companion proposal to move Table 344.24 from Article 344 to Article 300. All raceway Articles refer to this table for the radius of conduit or tubing bends. It is appropriate that this table belongs in this general section.

Panel Meeting Action: Accept in Principle

In the submitter's recommendation, change the reference "Table 300.18(C)" to "Table 2, Chapter 9."

Panel Statement:

The panel agrees that the table should appear in a more general location. Relocating the table to Chapter 9 will allow retention of the table under the purview of CMP 8.

CMP 8 recommends that the TCC review the placement (number) of the table in Chapter 9 for consistency in the overall Code organization and panel scope.

Refer to Proposal 8-24a (Log #CP 800).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: See my Explanation of Negative on Proposal 8-10 (Log #1241).

8-24a Log #CP800 NEC-P08 (Table 2 Chapter 9) **Final Action: Accept**

TCC Action:

The Technical Correlating Committee advises that assignment of Tables in Chapter 9 is the responsibility of the Technical Correlating Committee and the Technical Correlating Committee "Accepts" the Panel Action.

Submitter: Code-Making Panel 8

Recommendation:

Relocate Table 344.24 as new Table 2 in Chapter 9, Revise the table title to read as follows:
"Table 2 Radius of Conduit and Tubing Bends."
{The contents of the table remain unchanged.}

Substantiation:

The panel has relocated the table to a more general location in Chapter 9 since it applies to more than one article. Relocating the table to Chapter 9 will allow retention of the table under the purview of CMP 8.

CMP-8 recommends that the TCC review the placement (number) of the table in Chapter 9 for consistency in the overall Code organization and panel scope.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: See my Explanation of Negative on Proposal 8-10 (Log #1241).

8-25 Log #2619 NEC-P08 **Final Action: Reject**
(344-28 and 344.29)

Submitter: Richard F. Van Wert, Middle Department Inspection Agency

Recommendation:

Revise text to read as follows:
344.28 Reaming ~~and Threading~~. All cut ends shall be reamed or otherwise finished to remove rough edges.
344.29 Threading. Where conduit is threaded etc. All threaded conduit shall be threaded with a National Standard Pipe Taper (NPT) of 1 in. 16 (3/4 in.) taper per foot.

Substantiation:

Threading standard belongs in new 344.29. Incorporate information from 500.8(D)(1) and (2) threading information where it can be put to use.

Panel Meeting Action: Reject

Panel Statement:

The current text addresses field reaming and threading. Other threading is addressed by the product standards.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-26 Log #525 NEC-P08 **Final Action: Accept**
(344-30)

TCC Action:

It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting. This action will be considered by the panel as a public comment.

Submitter: James M. Daly, General Cable

Recommendation:

Delete text as follows:
RMC shall be installed as a complete system ~~as provided in Article 300~~ and shall be securely fastened in place and supported in accordance with 344.30(A) and (B).

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."
90.3 states that Chapters 1, 2, 3, and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: See my Explanation of Negative on Proposal 8-12 (Log #524).

8-27 Log #1092 NEC-P08 **Final Action: Reject**
(344-30 (New))

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence.
All support straps, clips, hangers, and similar support hardware shall be identified for the purpose.

Substantiation:

Conduit straps, clips, hangers may not be considered "fittings".
According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-13.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-28 Log #1244 NEC-P08 **Final Action: Accept**
(344-30)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
344.30 Securing and Supporting. RMC shall be installed as a complete system ~~as provided in Article 300~~ and shall be securely fastened in place and supported in accordance with 344.30(A) and (B).

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ''grounded in accordance with Article 250'' unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-29 Log #966 NEC-P08 **Final Action: Reject**
(344-30(B)(5))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add text to read as follows:
(5) Conduit shall be permitted to be fished through shallow crawlspaces without securing except as required by Section 344.30(A), provided the conduit is made up with threaded couplings, and it rests either on a basically continuous surface or on structural members spaced no further apart than permitted by Table 344.30(B)(2).

Substantiation:

As presently worded, it not clear, and hence inconsistently permitted that support can consist of anything other than being secured or passing through a hole. It specifically is quite unclear that fishing is permitted, and that resting on the ground, for example, can be used as a means of support. In other articles where fishing is permitted, it tends to be explicitly mentioned. Consider RMC run under an existing, low-to-the-ground deck. This corresponds to a proposal for Section 300.11.

Panel Meeting Action: Reject

Panel Statement:

The submitter's concerns of being able to "fish" are already permitted by 344.30(A) and 344.30(B)(2). The proposed additional text does not add clarity.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-30 Log #2867 NEC-P08 **Final Action: Accept in Principle**
(344-30(B)(3))

Submitter: Wayne A. Lilly Bridgewater, VA

Recommendation:

Revise Section 344.30(B)(3) so as to read as follows:
(3) Exposed vertical risers from industrial machinery or fixed equipment shall be permitted to be supported at intervals not exceeding 6 m (20 ft), if the conduit is made up with threaded couplings, the conduit is ~~firmly supported~~ securely fastened at the top and bottom of the riser, and no other means of intermediate support is readily available.

Substantiation:

Panel 8 is to be commended for clearly distinguishing between the concepts of securing and supporting as they apply to circular raceways. Part of the results are including both securing and supporting in the title of 344.30 and establishing separate sections within that section to address the unique requirements associated with both. As a part of the ongoing process of separating and clearly distinguishing between the two, a change in wording should be made in 344.30(B)(3). The concept of supporting the raceway at the top and bottom would still permit the raceway to move when subjected to force. This movement could damage the termination integrity or loosen couplings. Changing the wording to securely fastened will require that the raceway be secured so that the potential for damage from movement is greatly reduced.

Panel Meeting Action: Accept in Principle

Revise the submitters's recommendation to retain the word "supported" and add the word "and" so that the recommendation reads:
Revise Section 344.30(B)(3) to read as follows:
(3) Exposed vertical risers from industrial machinery or fixed equipment shall be permitted to be supported at intervals not exceeding 6 m (20 ft), if the conduit is made up with threaded couplings, the conduit is supported and securely fastened at the top and bottom of the riser, and no other means of intermediate support is readily available.

Panel Statement:

It is important to support and secure vertical runs at both the bottom and top of the run.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-30a Log #348 NEC-P08 **Final Action: Reject**
(344-30(B)(4))

Submitter: Glenn W. Zieseniss Crown Point, IN

Recommendation:

Revise text to read:
(4) Horizontal runs of RMC supported by openings which horizontal opening is not larger than 3 times the nominal inside diameter of the raceway through framing members at intervals not exceeding 3 m (10 ft) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.

Substantiation:

Some openings may be more than 10 feet in width. I have seen several installations where the raceways looked like snakes between termination points in the roof trusses. The 3 times the nominal ID of the raceway of the opening in the framing members would constrain the raceway to an appearance as required by NEC 110.12 (1st sentence). Workers installing other items or equipment can easily deflect the raceway either purposely or accidentally while doing their work. Painters or persons installing advertisements may disturb the electrical raceway position. The 3 times the nominal ID would allow some minor deflections of the raceway if the framing member openings are not in a straight line.

Panel Meeting Action: Reject

Panel Statement:

Refer to panel action and statement on Proposal 8-17.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-31 Log #584 NEC-P08 **Final Action: Accept**
(344-42(A))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
(A) Threadless. Threadless couplings and connectors used with conduit shall be made tight. Where buried in masonry or concrete, they shall be the concretetight type. Where installed in wet locations, they shall comply with 314.15(A) ~~be the raintight type~~. Threadless couplings and connectors shall not be used on threaded conduit ends unless listed for the purpose.

Substantiation:

314.15(A) requires such fittings to be listed for use in wet locations. Some wet location applications might require greater or lesser degrees of protection from the ingress of moisture as allowed for in the first sentence of 314.15(A) "...so as to prevent moisture from entering or accumulating...".

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-32 Log #1894 NEC-P08 **Final Action: Reject**
(344-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
344.60 Grounding. RMC shall be permitted as an equipment ~~grounding~~ bonding conductor.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-33 Log #273 NEC-P08 **Final Action: Reject**
(348-12)

Submitter: James M. Daly, General Cable

Recommendation:

Delete "in the following" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Reject

Panel Statement:

The NEC Style Manual allows the use of single words, phrases, or sentences in lists. The present text complies with the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-34 Log #3003 NEC-P08 **Final Action: Reject**
(348-12 Exception (New))

Submitter: Mark Ericksen, Ericksen Electric Inc.

Recommendation:

Add an exception to read as follows:
Exception: For 1/2 in., 3/4 in., and 1 in. EMT, there shall not be more than the equivalent of five quarter bends (450 degrees total) between pull points, e.g., conduit bodies and boxes. All of the kicks, offsets, and nineties, shall be bent with a minimum radius of twelve inches.

Substantiation:

There are many occasions to use this exception, in an existing building, or a new job, where the engineer shows a dedicated conduit run going from the panel, to the other end of the same floor, another floor, or the roof, with the wires being pulled to the other end, without the need of a junction box, except for the code (348-12). The electrical panel isn't always located in an easily accessible location, plus there is all the air conditioning ducts, plumbing pipe, large electrical conduits, and steel beams to have to run the conduit around, and then there are usually more bends than the code allows, before the conduit is finished.
The three graphs show the footage and lbs of pressure being exerted. The peaks, being the wire going through the nineties, and then back down, as it goes back into the straight part of the conduit.
Equipment used for Testing
Data acquisition system by Go-Power (GPS-2500 Series), strain gauge by (Interface, B92930) Greenlea 640 cable puller, nine #12 thhn-thwn solid wires, greenlee polyline pulling twine, rated at 210 lbs. Two wires were bent around a loop in the twine, and the other seven were taped, two at a time, to them. All three pulls were made up this way. There was no wire lube used, and the pulling twice was attached to the puller head solid, with a 8/32 bolt. The wire was all cut to length, laying on a clean floor, fed into the conduit, with no pushing or pulling. The only conduit size used was 1/2 in. emt 4 in. radius ninety. The other run was bent with a long radius ninety degree bender, that the radius is 12 in. It also had four nineties, and then we added a ninety to make the run with the five ninties.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

The panel recognizes that the submitter intended to address 358.26 of the 2002 NEC. The documentation and testing supplied with the substantiation was not conducted by a third-party testing lab. Testing not conducted by a third-party testing lab does not give the panel unquestionable results, so that they are comfortable changing the current safe practice.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-35 Log #1832 NEC-P08 **Final Action: Reject**
(348-12(1))

Submitter: David Zinck, NewburyPort Wiring Inspector

Recommendation:

Revise as follows:
348.12 Uses Not Permitted.
(1) In wet locations ~~unless the conductors are approved for the specific conditions and the installation is such that liquid is not likely to enter raceways or enclosures to which the conduit is connected~~.

Substantiation:

This is an article of Code whose time has come. This article was written at a time when it was recognized that a flexible wiring method was needed in the industry for outdoor wet locations. Originally it required that lead sheathed conductors be used. This was changed in the 1996 Code to "conductors approved for the specific conditions" because lead sheathed conductors were no longer manufactured. I wish it had been removed from the Code then. Liquidtight Flexible Metal Conduit (LFMC) and Liquidtight Flexible Nonmetallic Conduit (LFNMC) had not been invented when the "lead sheathed" option was written so there really was no other choice. Today, LFMC and LFNMC are so readily available most electricians wouldn't think of trying to wire any wet location in FMC. Most are not aware that they could get away with it (thank God). As inspector, I am seeing equipment in outdoor locations wired with it from the factory, most recently large rooftop Chiller Units. Even the fittings used say "Dry Locations Only" stamped on them. Because this comes this way from the factory, I can't do anything about it. My first concern is that the equipment will have a shorter trouble-free life span. My second is that when electricians learn they can use FMC in wet locations with THWN conductors, they will be wiring A/C condensers and swimming pools with it.

Panel Meeting Action: Reject

Panel Statement:

The substantiation does not demonstrate that the current text poses a safety issue.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 10 Negative: 3

Ballot Not Returned: 1 Cox

Explanation of Negative:

DOLLINS: Flexible Metal Conduit is not designed for use in wet locations. Liquid Tight Flexible Metal Conduit should be used in wet locations.

KENDALL: This proposal should be Accepted before a real safety issue causes an injury or death. FMC in a wet location is an unsafe application. The current language is relying on the conductors for a safe application when using FMC in a wet location application. LFNC and LFMC will guarantee that moisture due to the wet location will stay out of the raceway. The FLNC or LFMC will protect the application. The submitter is correct in his statement that LFNC and LFMC are predominantly used. The submitter, or anybody else, should forward field complaints on this subject to Underwriters Laboratories Inc.

WAGNER: The submitter is correct in his substantiation that there are listed forms of flexible conduit that are intended for use in wet locations. Therefore, it is unnecessary to perpetuate the current practice of permitting conductors approved for wet locations and an installation determined to be such that "liquid is not likely to enter the raceways or enclosure" in these applications. Liquidtight Flexible Metal Conduit and Liquidtight Flexible Nonmetallic Conduit are readily available and do not rely upon subjective determinations.

8-36 Log #678 NEC-P08 **Final Action: Reject**
(348-12(8) (New))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Add new text to read as follows:
(8) Where containing conductors operating at over 600 volts, nominal, except as permitted in 430.123 and 600.32(A).

Substantiation:

Flexible metal conduit is not listed for over 600 volt circuits except as permitted in Articles 430 and 600. This is important not permitted use and this caveat is noted for some wiring methods, e.g., 356.12(4). Although covered by 110.3(B), many Code users may not be privy to listing conditions, and focus on this article or infer from Articles 430 or 600 that over 600 volt circuits are permitted. Section 330.12 clearly indicates use for over 600 volts, and some cable wiring methods are marked with voltage ratings. If 110.3(B) is deemed all that is necessary, other wiring method uses permitted and not permitted could be deleted from Chapter 3 wiring methods.

Panel Meeting Action: Reject

Panel Statement:

Section 300.2(A) specifically limits the voltage to 600 or less unless allowed in other parts of the code.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-37 Log #1133 NEC-P08 **Final Action: Reject**
(348-20(A)(6))

Submitter: Ray C. Mullin, Ray C. Mullin / Rep. Ray C. Mullin Books

Recommendation:

Add new:
(6) FMC trade size 3/8 shall be permitted to be fished through walls and ceilings to connect recessed luminaires (fixtures) in lengths not to exceed 7.6 m (25 ft). A 14 AWG equipment grounding conductor shall be installed in this FMC.

Substantiation:

Every day, electricians are installing "old-work" recessed luminaires in existing installations fishing 3/8 inch FMC through the ceilings and walls. It is impossible and impractical to use 1/2 in. FMC. The above proposal will make it legal to do what is already being done thousands of times each day.

Panel Meeting Action: Reject

Panel Statement:

FMC is produced in standard sizes of 1/2" through 4". The 3/8" size is produced for special applications and is not intended as a general-use wiring method. The panel is also not convinced that a 14 AWG equipment grounding conductor would meet the requirements of Article 250 in all cases. The submitter has not provided technical substantiation to support the change.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DOLLINS: The proposal should be accepted. Fishing of 3/8 in. flexible Metal Conduit in lengths not to exceed 7.6m (25 ft) provides an excellent method for rewiring recessed luminaines and should be allowed as long as an appropriately sized equipment grounding conduct or is installed.

8-38 Log #585 NEC-P08 **Final Action: Accept**
(348-22)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
Number of Conductors. The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is ~~permitted~~ not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

The second paragraph of this section was added for the 2002 NEC. The substantiation for adding this provision was that..."The proposed language clarifies that cables, where permitted elsewhere in the Code, are allowed to be used in a raceway." Cable Articles are structured so that installation in raceways is not prohibited. The proposed revision will correlate the desired clarification with the cable Articles, which do not specifically permit installation in raceways but instead do not prohibit installation in raceways.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-39 Log #1201 NEC-P08 **Final Action: Accept**
(348-22)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
348.22 Number of Conductors.
The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is not prohibited ~~permitted~~ by the respectice cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

This change agrees with the panel's intent and substantiation for placing this language in the 2002 code. It was the panel's intent to allow cables in raceways unless prohibited in the respective cable article.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-40 Log #1895 NEC-P08 **Final Action: Reject**
(Table 348-22 Note)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
*In addition, one covered or bare equipment ~~grounding~~ bonding conductor of the same size shall be permitted.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-41 Log #1245 NEC-P08 **Final Action: Accept in Principle**
(348-24)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
348.24 Bends — How Made. Bends in conduit shall be made so that the conduit is not damaged and the internal diameter of the conduit is not effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment. The radius of the curve to the centerline of any bend shall not be less than shown in Table 300.18(C) ~~344.24~~ using the column "Other Bends."

Substantiation:

This is a companion proposal to move Table 344.24 from Article 344 to Article 300. All raceway Articles refer to this table for the radius of conduit or tubing bends. It is appropriate that this table belongs in this general section.

Panel Meeting Action: Accept in Principle

In the submitter's recommendation, change the reference "Table 300.18(C)" to "Table 2, Chapter 9."

Panel Statement:

The panel agrees that the table should appear in a more general location. Relocating the table to Chapter 9 will allow retention of the table under the purview of CMP 8.

CMP-8 recommends that the TCC review the placement (number) of the table in Chapter 9 for consistency in the overall Code organization and panel scope.

Refer to Proposal 8-24a (Log #CP800).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: See my Explanation of Negative on Proposal 8-10 (Log #1241).

8-42 Log #1093 NEC-P08 **Final Action: Reject**
(348-30 (New))

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence.
All support straps, clips, hangers, and similar support hardware shall be identified for the purpose.

Substantiation:

Conduit straps, clips, hangers may not be considered "fittings".
According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-13.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-43 Log #225 NEC-P08 **Final Action: Accept in Principle**
(348-30(A) Exception No. 2)

Submitter: Jerry D. Cain, Lodestar Energy Inc.

Recommendation:

Revise text for Exception No. 2 as follows:
348.30 Securing and Supporting. FMC shall be securely fastened in place and supported in accordance with 348.30(A) and (B).
(A) Securely Fastened. FMC shall be securely fastened in place by an approved means within 300 mm (12 in.) of each box, cabinet, conduit body, or other conduit termination and shall be supported and secured at intervals not to exceed 1.4 m (4 1/2 ft).
Exception No. 1: Where FMC is fished.
Exception No. 2: Lengths not exceeding the following:
900 mm (3 ft) for sizes 16 to 35 (1/2 to 1 1/4)
1200 mm (4 ft) for sizes 41 to 53 (1 1/2 to 2)
1500 mm (5 ft) for 63 (2 1/2) and larger
at terminals where flexibility is required.

Substantiation:

1. Motor junction box size and location vary from one manufacture to another, the NEMA or IEC frame sizes only designate the motor footprint for mounting, shaft dimensions and location of shaft in relation to motor footprint. This is also a problem when rewind shops return repaired motors with junction boxes different from the originals. Note that most manufacturers locate the J-box near the center of the motor, though I have seen some located closer to the end. On several occasions modifications to the conduit and/or liquidtight length have been required when changing motors. This adds costly downtime.
2. V-Belt driven equipment requires movement of the motor to install and adjust the belts while 3 ft is more than adequate on small motors, 3 ft is not sufficient on the larger motors without causing damage to the liquidtight. It also makes it much easier to change a motor when the liquidtight is long enough to allow one to bend it into position without the use of a hoist or other means.
3. Use of longer lengths of liquidtight allows the conduit to be located out of harms way when installing conduit equipment that requires servicing.
Please note the differences in motor junction box locations and sizes in the three photograph references exhibits A, B, and C, all of which are 250 horsepower motors from different manufactures.
Exhibit A - the junction box is forward mounted and large capacity
Exhibit B - the junction box is centrally located, but rather small for making connections
Exhibit C - the junction box is centrally located, similar to exhibit B except for larger J-box that is offset to one en.d
In all three examples, the conduit cannot enter from the rear due to location of other equipment, and if the conduit where located approaching straight from the front, it would be in the way and also subject to physical damage. I feel the best location is as shown entering from above with liquidtight sufficient length to allow for replacement and adjustment of the V-Belts. Due to the rigidity of the larger sizes of liquidtight, this should have no effect from an electrical safety standpoint. But would greatly improve ease of maintenance and eliminate having to modify the conduit system when changing motors.
Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Revise the submitter's recommendation to read as follows:
Exception No. 2: At terminals where flexibility is required, lengths shall not exceed:
(1) 900 mm (3 ft) for metric designators 16 through 35 (trade sizes 1/2 through 1 1/4)
(2) 1200 mm (4 ft) for metric designators 41 to 53 (trade size 1 1/2 through 2)
(3) 1500 mm (5 ft) for metric designators 63 (trade size 2 1/2) and larger.

Panel Statement:

The revisions meet the submitter's concerns while complying with 2.1.5.1 of the NEC Style Manual, employing the word "through" to make the requirements clear and including the maximum permitted size.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-44 Log #2131 NEC-P08 **Final Action: Reject**
(348-30(A) Exception No. 2)

Submitter: Michael Hamilton, Hickey Electric

Recommendation:

Revise the exception as follows by striking out "where flexibility is required":
Exception No. 2: Lengths not exceeding 900 mm (3 ft) at terminals ~~where flexibility is required~~.

Substantiation:

The reference to flexibility is not needed. Flexible metal conduit would not be used if some flexibility was not needed. Sometimes the equipment supplied will move during operation thus requiring a connection that is free to move. Frequently, the FMC is used to prevent vibration transmission, but the conduit is not intended to actually move during normal operation. It makes no difference which condition is intended, there should be no difference in whether this exception is applied. The reference to flexibility in this section seems to cause confusion when considering the reference to not installed for flexibility in 280.118(6)(d). The term "flexibility" is not defined in the NEC and will have different meanings to different installers and inspectors.

Panel Meeting Action: Reject

Panel Statement:

Where flexibility is not needed, the raceway must be securely fastened per Code. The current language of the exception accounts for situations where damage could occur to equipment if the allowance is not permitted. The panel assumes the submitter's reference of 280.118(6)(d) is actually 250.118(6)(d).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-45 Log #16 NEC-P08 **Final Action: Accept in Principle**
(348-30(A) Exception No. 4 (New))

NOTE: The following proposal consists of Comment 8-74 on Proposal 8-315 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 8-315 was:
Revise Article 350 to read as follows:

[Text of (May 2001) Proposal 8-315 is shown on page 2316]

Submitter: Joseph A. Ross, Ross Seminars

Recommendation:

Add new text as follows:
Exception No. 4: Lengths not exceeding 6-feet (1.83m) from an outlet for connection within an accessible ceiling to lighting fixtures or equipment.

Substantiation:

This revised exception is not to be considered new material. Note: The proper text presently appears in Sections 333-7(b)(3), 334-10(b), and 336-18 Exception No. 2. This Comment corrects an omission. See companion Comments for Sections 331-30(a) Exception and 3XX-30(a) Exception.

The omission must be corrected as 6 foot lengths (whips) are presently manufactured and listed and in common use today. Some inspectors have rejected their use.

The term "whip" is not defined in the NEC, but everyone knows what a "whip" is and takes for granted that flexible raceways and cables are permitted for this use. However, many misinterpret that Section 410-67(c) addresses "whips" and believe the method is covered. It is not.

Section 410-67(c) was introduced into the NEC to permit a transition from the hi-temp fixture wires of a recessed incandescent fixture to lo-temp branch-circuit wires. That is, a recessed incandescent fixture was provided with a 6 foot "tail" of flexible metal raceway or metal-sheathed cable containing hi-temp fixture wire for connection, within a field installed junction box, to lo-temp branch-circuit wiring. The 6 foot "tail" assured that the heat of the fixture would not be transmitted to the branch-circuit wiring.

This method provided for the fixture to be installed in a plastered or sheetrock (nonaccessible) ceiling cavity and the junction box being "placed" rather than rigidly supported and fastened. The unsupported "tail" and branch-circuit wiring assures that the box is accessible and may be retrieved (for any reason) through the fixture trim opening by removing the fixture.

A "whip" application is quite different, i.e., a "whip" is permitted to be unsupported, not more than 6-feet in length, and run from an accessible and rigidly supported and fastened outlet box for connection within an accessible ceiling to lighting fixtures or equipment.

Panel Meeting Action: Accept in Principle

Revise the submitter's recommendation to read as follows:
Exception No. 4: Lengths not exceeding 1.8 m (6 ft) from the last point of support for connections within an accessible ceiling to luminaire(s) [lighting fixture(s)] or other equipment.

Panel Statement:

The phrase "an outlet" was unnecessarily restrictive. The same allowance should also apply to other equipment. The revised text meets the intent of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: The strapping requirements should continue to apply for equipment in an accessible ceiling.

8-46 Log #17 NEC-P08 **Final Action: Accept in Principle**
(348-30(A) Exception No. 4)

NOTE: The following proposal consists of Comment 8-75 on Proposal 8-315 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. [See Proposal 8- (Log #16)]

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Accept in principle add the following: Exception No. 4: The support interval from terminations at luminaires or equipment in or on suspended ceilings shall be permitted to be increased where all the following conditions are met: (1) structural members (including support wires or rods and ceiling grid members, where permitted to be used) do not permit the support interval required by this section; (2) the nearest readily available support member is used; (3) the support interval does not exceed 1.4m (4 1/2 ft); and (4) the FMC is above the suspended ceiling.

Substantiation:

Similar relaxation of support requirements are provided for other wiring methods e.g., Type AC, MC, NMSC cables, RMC, IMC, EMT, which should be applicable to FMC. The proposal relaxes the 12 in. requirement only where no suitable support is available but requires fastening to suitable support that is available at less than 4 1/2 ft intervals, such as a structural ceiling or suspended ceiling assembly.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the panel action and statement on Proposal 8-45.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-47 Log #347 NEC-P08 **Final Action: Reject**
(348-30(B))

Submitter: Glenn W. Zieseniss Crown Point, IN

Recommendation:

Revise text to read:
(B) Horizontal runs of flexible metal conduit FMC supported by openings <u>which horizontal opening is not larger than 6 times the nominal inside diameter of the raceway</u> through framing members at intervals not greater than 1.4 m (4 1/2 ft) and securely fastened within 300 mm (12 in.) of termination points shall be permitted.

Substantiation:

Some openings may be more than 10 feet in width. I have seen several installations where the raceways looked like snakes between termination points in the roof trusses. The 3 times the nominal ID of the raceway of the opening in the framing members would constrain the raceway to an appearance as required by NEC 110.12 (1st sentence). Workers installing other items or equipment can easily deflect the raceway either purposely or accidentally while doing their work. Painters or persons installing advertisements may disturb the electrical raceway position. The 3 times the nominal ID would allow some minor deflections of the raceway if the framing member openings are not in a straight line.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-17.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-48 Log #1213 NEC-P08 **Final Action: Reject**
(348-42)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
348.42 ~~Couplings and~~ Connectors.

Substantiation:

There are no couplings manufactured for FMC.

Panel Meeting Action: Reject

Panel Statement:

The submitter's substantiation is incorrect. There are listed couplings manufactured for FMC. In addition, the common header "Couplings and Connectors" is a valid heading used for multiple wiring articles and should remain.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-49 Log #1000 NEC-P08 **Final Action: Reject**
(348-60)

Submitter: Noel Williams, Noel Williams Consulting

Recommendation:

Revise this section to read:
"Where used to connect equipment where flexibility is required after installation, a separate equipment grounding conductor shall be installed." (Remainder unchanged).

Substantiation:

This is a companion to proposals to 250.118 and 350.60. Flexible conduits are nearly always installed for flexibility in installation. This fact often results in misinterpretations that require separate equipment grounding conductors in virtually all flexible conduits. Flexibility during installation should not be the concern of this section. The concern is that the conduit may be required to be flexible so that the equipment may move or be moved while in use and that such use may damage or otherwise impair the continuity of the grounding path. In such cases, a redundant equipment grounding conductor should be installed. The panel has already rejected proposals to previous editions of the NEC to require separate equipment grounding conductors where equipment is subject to vibration, as everything is subject to some vibration, however minimal. Impairment of the grounding path is most likely when some strain is imposed on the connectors, which in turn is most likely when equipment must be allowed to move for some reason.

Panel Meeting Action: Reject

Panel Statement:

The present language in the code covers the submitter's concerns. The proposed additional wording is redundant to the requirements of 250.134(B). The panel does not agree that flexibility is a concern only after installation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-50 Log #1246 NEC-P08 **Final Action: Accept in Principle**
(348-60)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
348.60 Grounding and Bonding. FMC shall be permitted as an equipment grounding conductor where installed in accordance with 250.118(5) or 250.118(6).
Where used to connect equipment where flexibility is required, an equipment grounding conductor shall be installed.
Where required or installed, equipment grounding conductors shall be installed in accordance with 250.134(B).
Where required or installed, equipment bonding jumpers shall be installed in accordance with 250.102.

Substantiation:

The present Code ignores the permission given in Sections 250.134(A) and 250.118 to use the flexible metal conduit as a grounding means. An additional equipment grounding conductor must be installed only where flexibility of the conduit does not ensure a continued path to ground.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the panel action and statement on Proposal 8-51.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-51 Log #2803 NEC-P08 **Final Action: Accept in Principle in Part**
(348-60)

Submitter: Henry A. Jenkins, Wake County

Recommendation:

Add a new first sentence to 348.60 as follows:
FMC shall be permitted as an equipment grounding conductor where installed in accordance with 250.118(5) or 250.118(6).
Add the word "additional" in the existing first sentence (the new second sentence) after the word "an" and before the word "equipment".
Where used to connect equipment where flexibility is required, an additional equipment-grounding conductor shall be installed.

Substantiation:

The present Code ignores the permission given in 250.134(A) and 250.118 to use the flexible metal conduit as a grounding means. An additional equipment-grounding conductor must be installed only where flexibility of the conduit does not ensure a continued path to ground.

Panel Meeting Action: Accept in Principle in Part

Revise 348.60 to read as follows:
348.60 Grounding and Bonding. Where used to connect equipment where flexibility is required, an equipment grounding conductor shall be installed.
Where flexibility is not required, FMC shall be permitted to be used as an equipment grounding conductor when installed in accordance with 250.118(5) or (6).
Where required or installed, equipment grounding conductors shall be installed in accordance with 250.134(B).
Where required or installed, equipment bonding jumpers shall be installed in accordance with 250.102.

Panel Statement:

The panel accepts in principle the proposed new first sentence. The revised text more clearly reflects the intent of the panel.
The word "additional" is rejected and would create confusion pertaining to redundant grounding paths. A redundant equipment grounding conductor is not required.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-52 Log #2868 NEC-P08 **Final Action: Reject**
(348-60)

Submitter: Wayne A. Lilly Bridgewater, VA

Recommendation:

Revise Section 348.60 so as to read as follows:
348.60 Grounding and Bonding. Where used to connect equipment where flexibility is required, an equipment grounding conductor shall be installed within the FMC.
Where required or installed, equipment grounding conductors shall be installed in accordance with 250.134(B).
Where required or installed, equipment bonding jumpers shall be installed in accordance with 250.102.

Substantiation:

This section was added for those situations where the FMC was being used as an equipment grounding conductor and flexibility was an issue. In this situation, there were reported cases where the FMC became loose at its connector or the connector became loose. In either case, the equipment grounding conductor circuit was interrupted. The current language, along with the language in 250.102(E), permits a conductor to be installed from connector to connector on the outside of the FMC. If one or both of the connectors become loose, the equipment ground path is interrupted. Adding the language "within the FMC" requires the equipment grounding conductor to be installed within the FMC. This will require the equipment grounding conductor to be connected ahead of the connector used to terminate the FMC. If the connector becomes loose the equipment grounding path is still intact.

Panel Meeting Action: Reject

Panel Statement:

The present language in the Code covers the submitter's concerns. The proposed additional wording is redundant to the requirements of 250.134(B).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: The panel should Accept this proposal, requiring the equipment grounding conductor inside the raceway. The raceway protects the conductors from physical damage. The FMC is often used for flexibility, and the lock nuts may loosen.

8-53 Log #1896 NEC-P08 **Final Action: Reject**
(348-60 Note)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
348.60 Grounding and Bonding. Where used to connect equipment where flexibility is required, an equipment ~~grounding~~ bonding conductor shall be installed.
Where required or installed, equipment ~~grounding~~ bonding conductors shall be installed in accordance with 250.134(B).
Where required or installed, equipment ~~grounding~~ bonding jumpers shall be installed in accordance with 250.102.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-54 Log #1220 NEC-P08 **Final Action: Reject**
(350-2, 350.6)

Submitter: Richard Fransen, Daiken America, Inc. / Rep. Cable Fire Research Association

Recommendation:

Add a new definition to Section 350.2 as follows:
Liquidtight Flexible Metal Conduit for Air Ducts (LFMCD). A raceway meeting all the requirements for Type LFMC that is also listed as limited fire hazard raceway having a low potential heat value, low flame spread characteristics and very low smoke-producing characteristics.
Add the following to the end on 350.6.
Liquidtight Flexible Metal Conduit for Air Ducts (LFMCD) shall also be listed as a limited fire hazard raceway having a low potential heat value, low flame spread characteristics and very low smoke-producing characteristics.
FPN: One method of defining a low potential heat raceway is establishing an acceptable value of potential heat when tested in accordance with NFPA 259, Standard Test Method for Potential Heat of Building Materials, to a maximum potential heat value not exceeding 8141 kJ/kg (3500 BTU/lb). One method of defining low flame spread raceway is establishing an acceptable value of flame spread when tested in accordance with NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials, to a maximum flame spread index of 25. Similarly, one method of defining very low smoke-producing raceway is establishing an acceptable value when tested in accordance with NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials, to maximum smoke developed index of 50. These test methods and resultant values correlate with the requirements of NFPA 90A-2002, Standard for the Installation of Air-Conditioning and Ventilating System for materials installed in ducts and plenums.

Substantiation:

This proposal is being offered as an alternate to the proposal from the Technical Committee on Air Conditioning that proposed to eliminate the use of liquidtight flexible metal conduit in ducts and plenums, other than ceiling cavity plenums and raised floor plenums, because of a conflict with NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems. This proposal would establish listing requirements for limited fire hazard liquidtight flexible metal conduit and permit its use in Section 300.22(B) in place of combustible liquidtight flexible metal conduit and thereby comply with NFPA 90A by meeting the requirements for supplementary materials in air ducts. NFPA 90A requires that supplementary materials for air distribution systems have a maximum flame spread index of 25 and a maximum smoke developed index of 50.
The proposed requirements for limited fire hazard raceway meet the requirements of NFPA 90A for use in ceiling cavity plenums and raised floor plenums and exceed the requirements for supplementary materials in ducts. If the requirements were set to the minimum required for supplementary materials, then the raceway would not be permitted in ceiling cavity plenums and raised floor plenums.

Panel Meeting Action: Reject

Panel Statement:

Insufficient technical substantiation is provided, and product information is not included with the proposal.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-55 Log #2368 NEC-P08 **Final Action: Reject**
(350-2–Liquidtight Flexible Metal Conduit for Air Ducts, 350.6, 300.22 (B))

Submitter: Richard Fransen, Daiken America, Inc.

Recommendation:

Add a new definition to 350.2 as follows:
Liquidtight Flexible Metal Conduit for Air Ducts (LFMCD). A raceway meeting all the requirements for Type LFM that is also listed as a limited fire hazard raceway having a low potential heat value, low flame spread characteristics and very low smoke-producing characteristics.
Add the following to the end of 350.6.
Liquidtight Flexible Metal Conduit for Air Ducts (LFMCD) shall also be listed as a limited fire hazard raceway having a low potential heat value, low flame spread characteristics and very low smoke-producing characteristics.
FPN: One method of defining a low potential heat raceway is establishing an acceptable value of potential heat when tested in accordance with NFPA 259, Standard Test Method for Potential Heat of Building Materials, to a maximum potential heat value not exceeding 8141 kJ/kg (3500 BTU/lb). One method of defining low flame spread raceway is establishing an acceptable value of flame spread when tested in accordance with NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials, to a maximum flame spread index of 25. Similarly, one method of defining very low smoke-producing raceway is establishing an acceptable value when tested in accordance with NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials to a maximum smoke developed index of 50. These test methods and resultant values correlate with the requirements of NFPA 90A-2002, Standard for the Installation of Air-Conditioning and Ventilating System for materials installed in ducts and plenums.
Revise Section 300.22(B):
(B) Ducts or Plenums (Other than Ceiling Cavity and Raised Floor Plenums) Used for Environmental Air. Only wiring methods consisting of Type MI cable, Type MC cable employing a smooth or corrugated impervious metal sheath without an overall nonmetallic covering, Type EMT, electrical metallic tubing, flexible metallic tubing, Type IMC, intermediate metal conduit, or Type RMC, rigid metal conduit without an overall nonmetallic covering shall be installed in ducts or plenums specifically fabricated to transport environmental air. Type, LFMC, flexible metal conduit and Type LFMCD, liquidtight flexible metal conduit for air ducts, shall be permitted, in lengths not to exceed 1.2 m (4 ft), to connect physically adjustable equipment and devices permitted to be in these ducts and plenum chambers. The connectors used with flexible metal conduit shall effectively close any openings in the connection. Equipment and devices shall be permitted within such ducts or plenum chambers only if necessary for their direct action upon, or sensing of, the contained air. Where equipment or devices are installed and illumination is necessary to facilitate maintenance and repair, enclosed gasketed-type luminaires (fixtures) shall be permitted.

Substantiation:

This proposal is being offered as an alternate to the proposal from the Technical Committee on Air Conditioning that proposed to eliminate the use of liquidtight flexible metal conduit in ducts and plenums, other than ceiling cavity plenums and raised floor plenums, because of a conflict with NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems. This proposal would establish listing requirements for limited fire hazard liquidtight flexible metal conduit and permit its use in section 300.22(B) in place of combustible liquidtight flexible metal conduit and thereby comply with NFPA 90A by meeting the requirements for supplementary materials in air ducts. NFPA 90A requires that supplementary materials for air distribution systems have a maximum flame spread index of 25 and a maximum smoke developed index of 50.
The proposed requirements for limited fire hazard raceway meet the requirements of NFPA 90A for use in ceiling cavity plenums and raised floor plenums and exceed the requiremens for supplementary materials in ducts. If the requirements were set to the minimum required for supplementary materials, then the raceway would not be permitted in ceiling cavity plenums and raised floor plenums.

Panel Meeting Action: Reject
Panel Statement:
Refer to panel action and statement for Proposal 8-54.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13
Ballot Not Returned: 1 Cox

8-56 Log #274 NEC-P08 **Final Action: Reject**
(350-10)

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Reject
Panel Statement:
The NEC Style Manual allows the use of single words, phrases, or sentences in lists. The present text complies with the NEC Style Manual.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13
Ballot Not Returned: 1 Cox

8-57 Log #811 NEC-P08 **Final Action: Reject**
(350-10)

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text to read as follows:
Uses Permitted. LFMC shall be permitted ~~in exposed or concealed~~ locations as follows:
(1) In exposed or concealed locations.
~~(1)~~(2) Where conditions of installation, operation, or maintenance require flexibility or protection from liquids, vapors, or solids.
~~(2) As permitted by 501.4(B), 502.4, 503.3 and 504.20, and in other hazardous (classified) locations where specifically approved, and by 553.7(B).~~
(3) For direct burial where listed and marked for the purpose.

Substantiation:

Present wording appears to limit the use to the "as follows" conditions (1), (2), and (3) and not permit use where none of those conditions apply. Section 348.10 does not impose conditions on use of FMC. It is not necessary (but helpful) to reference other sections in present (2) since 90.3 applies. Such references are not noted in 348.10 or 356.10 even though they permit one or both of those conduits. "Specifically approved" does not require listing, and may or may not be a criteria for approval by the Authority Having Jurisdiction.

Panel Meeting Action: Reject

Panel Statement:

The changes proposed do not provide clarity to the Code. In addition, the current text provides information and requirements that are useful to Code users.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-58 Log #275 NEC-P08 **Final Action: Reject**
(350-12)

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Reject

Panel Statement:

The NEC Style Manual allows the use of single words, phrases, or sentences in lists. The present text complies with the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-59 Log #1203 NEC-P08 **Final Action: Accept**
(350-22)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
350.22 Number of Conductors.
The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is not prohibited ~~permitted~~ by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

This change agrees with the panel's intent and substantiation for placing this language in the 2002 code. It was the panel's intent to allow cables in raceways unless prohibited in the respective cable article.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-60 Log #587 NEC-P08 **Final Action: Accept**
(350-22(A))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
Number of Conductors or Cables.
(A) Metric Designators 16 through 103 (Trade Sizes 1/2 through 4). The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is ~~permitted~~ not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

The second paragraph of this section was added for the 2002 NEC. The substantiation for adding this provision was that... "The proposed language clarified that cables, where permitted elsewhere in the Code, are allowed to be used in a raceway." Cable articles are structured so that installation in raceways is not prohibited. The proposed revision will correlate the desired clarification with the cable articles, which do not specifically permit installation in raceways but instead do not prohibit installation in raceways.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-61 Log #1247 NEC-P08 **Final Action: Accept in Principle**
(350-24)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
350.24 Bends — How Made. Bends in conduit shall be made so that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment. The radius of the curve to the centerline of any bend shall not be less than shown in Table 300.18(C) ~~344.24~~ using the column "Other Bends."

Substantiation:

This is a companion proposal to move Table 344.24 from Article 344 to Article 300. All raceway Articles refer to this table for the radius of conduit or tubing bends. It is appropriate that this table belongs in this general section.

Panel Meeting Action: Accept in Principle

In the submitter's recommendation, change the reference "Table 300.18(C)" to "Table 2, Chapter 9."

Panel Statement:

The panel agrees that the table should appear in a more general location. Relocating the table to Chapter 9 will allow retention of the table under the purview of CMP 8.

CMP 8 recommends that the TCC review the placement (number) of the table in Chapter 9 for consistency in the overall Code organization and panel scope.

Refer to Proposal 8-24a (Log #CP800).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: See my Explanation of Negative on Proposal 8-10 (Log #1241).

8-62 Log #1503 NEC-P08 **Final Action: Reject**
(350-24)

Submitter: Troy Michael Mossoni, Encompass Electrical Technologies

Recommendation:

Revise text to read as follows:
Bends - How Made. Bends in conduit shall be made so that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment. The radius of the curve to the centerline of any bend shall ~~not be less~~ be more than shown in Table 344.24 using the column "Other Bends".

Substantiation:

The current wording is a bit confusing and my revised wording is easier to understand.

Panel Meeting Action: Reject

Panel Statement:

The present text is clear as written.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

Comment on Affirmative:

LILLY: I agree with the action taken by the Panel to reject this proposal. However, I think the Panel Statement is lacking. Using the proposed language, "shall be more than", would change the existing limits. Consider metric designator 12, the 1/2 in. trade size. The current language requires a minimum bending radius of 4 in. The proposed language would require the minimum bending radius to be more than 4 in.
A second sentence should be added to the Panel Statement. The additional sentence should read: "The proposed language would increase the minimum bending radius without offering substantiation for the increase."

8-63 Log #1094 NEC-P08 **Final Action: Reject**
(350-30)

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence.
All support straps, clips, hangers, and similar support hardware shall be identified for the purpose.

Substantiation:

Conduit straps, clips, hangers may not be considered "fittings".
According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-13.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-64 Log #19 NEC-P08 **Final Action: Accept in Principle**
(350-30(A) Exception No. 3)

NOTE: The following proposal consists of Comment 8-79 on Proposal 8-327 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 8-327 was:
Separate existing Article 351 into two distinct articles; Liquidtight Flexible Metal Conduit and Liquidtight Flexible Nonmetallic Conduit. This proposal contains the proposed text for Liquidtight Flexible Metal Conduit. See companion proposal for Liquidtight Flexible Nonmetallic Conduit, Article 3YY.

Submitter: Joseph A. Ross, Ross Seminars

Recommendation:

Revise Exception No. 3 as follows:
Exception No. 3: Lengths not exceeding 6 ft (1.83m) from an outlet for connection within an accessible ceiling to lighting fixtures or equipment.

Substantiation:

This revised exception is not to be considered new material. Note: The proper text presently appears in Sections 333-7(b)(3), 334-10(b), and 336-18 Exception No. 2. This Comment corrects an omission. The Exception is revised as it is very unlikely that LFMC would be permitted to contain hi-temp conductors as addressed by Section 410-67(c). See companion Comments for Sections 331-30(a) Exception, 350-30 Exception and 3XX(51)-30(a) Exception No. 4.

The omission must be corrected as 6 foot lengths (whips) are presently manufactured and listed and in common use today. Some inspectors have rejected their use.

The term "whip" is not defined in the NEC, but everyone knows what a "whip" is and takes for granted that flexible raceways and cables are permitted for this use. However, many misinterpret that Section 410-67(c) addresses "whips" and believe the method is covered. It is not.

Section 410-67(c) was introduced into the NEC to permit a transition from the hi-temp fixture wires of a recessed incandescent fixture to lo-temp branch-circuit wires. That is, a recessed incandescent fixture was provided with a 6 foot "tail" of flexible metal raceway or metal-sheathed cable containing hi-temp fixture wire for connection, within a field installed junction box, to lo-temp branch-circuit wiring. The 6 foot "tail" assured that the heat of the fixture would not be transmitted to the branch-circuit wiring.

This method provided for the fixture to be installed in a plastered or sheetrock (nonaccessible) ceiling cavity and the junction box being "placed" rather than rigidly supported and fastened. The unsupported "tail" and branch-circuit wiring assures that the box is accessible and may be retrieved (for any reason) through the fixture trim opening by removing the fixture.

A "whip" application is quite different, i.e., a "whip" is permitted to be unsupported, not more than 6 feet in length, and run from an accessible and rigidly supported and fastened outlet box for connection within an accessible ceiling to lighting fixtures or equipment.

Panel Meeting Action: Accept in Principle

Revise the submitter's recomendation to add new Exception No. 4 to read as follows:

Exception No. 4: Lengths not exceeding 1.8 m (6 ft) from the last point of support for connections within an accessible ceiling to luminaire(s) [lighting fixture(s)] or other equipment.

Panel Statement:

The panel chose to add a new exception to provide consistency with the panel action on Proposal 8-45. The phrase "an outlet" was unnecessarily restrictive. The same allowance should also apply to other equipment. The revised text meets the intent of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-65 Log #18 NEC-P08 **Final Action: Accept in Principle**
(350-30(A) Exception No. 4)

NOTE: The following proposal consists of Comment 8-76 on Proposal 8-329 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 8-329 was:

[Text of (May 2001) Proposal 8-329 is shown on page 2318]

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Accept in principle, add the following: Exception No.4: The support interval from terminations at luminaires or equipment in or on suspended ceilings shall be permitted to be increased where all the following conditions are met: (1) structural members (including support wires or rods and ceiling grid members, where permitted to be used) do not permit the support interval required by this section; (2) the nearest readily available support member is used; (3) the support interval does not exceed 1.4 m (4 1/2 ft.); and (4) the LTFMC is above the suspended ceiling.

Substantiation:

Similar relaxation of support requirements are provided for other wiring methods e.g., Type AC, MC, NMSC cables, RMC, IMC, EMT. The proposal relaxes the 12 in. requirement only where no suitable support is available but requires fastening to suitable support that is available at less than 4 1/2 ft. intervals, such as a structural ceiling or suspended ceiling assembly.

If this proposal is accepted the panel may wish to provide something similar for LTFNMC.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the panel action and statement on Proposal 8-64.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-66 Log #346 NEC-P08 **Final Action: Reject**
(350-30(B))

Submitter: Glenn W. Zieseniss Crown Point, IN

Recommendation:

Revise text to read:

(B) Horizontal runs of LFMC supported by openings <u>which horizontal opening is not larger than 6 times the nominal inside diameter of the raceway</u> through framing members at intervals not greater than 1.4 m (4 1/2 ft) and securely fastened within 300 mm (12 in.) of termination points shall be permitted.

Substantiation:

Some openings may be more than 10 feet in width. I have seen several installations where the raceways looked like snakes between termination points in the roof trusses. The 3 times the nominal ID of the raceway of the opening in the framing members would constrain the raceway to an appearance as required by NEC 110.12 (1st sentence). Workers installing other items or equipment can easily deflect the raceway either purposely or accidentally while doing their work. Painters or persons installing advertisements may disturb the electrical raceway position. The 3 times the nominal ID would allow some minor deflections of the raceway if the framing member openings are not in a straight line.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-17.

Number Eligible to Vote: 14

Affirmative: 13

Ballot Not Returned: 1 Cox

8-67 Log #1202 NEC-P08 **Final Action: Reject**
(350-42)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
350.42 ~~Couplings and~~ Connectors.

Substantiation:

There are no couplings manufactured for FMC.

Panel Meeting Action: Reject

Panel Statement:

The panel recognizes that there are no listed couplings manufactured for LFMC. However, the common header "Couplings and Connectors" is a valid one used for multiple wiring articles and should remain. The panel recognizes that the submitter intended to refer to LFMC, not FMC.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-68 Log #1001 NEC-P08 **Final Action: Reject**
(350-60)

Submitter: Noel Williams, Noel Williams Consulting

Recommendation:

Revise this section to read:
"Where used to connect equipment where flexibility is required after installation, a separate equipment grounding conductor shall be installed." (Remainder unchanged).

Substantiation:

This is a companion to proposals to 250.118 and 348.60. Flexible conduits are nearly always installed for flexibility in installation. This fact often results in misinterpretations that require separate equipment grounding conductors in virtually all flexible conduits. Flexibility during installation should not be the concern of this section. The concern is that the conduit may be required to be flexible so that the equipment may move or be moved while in use and that such use may damage or otherwise impair the continuity of the grounding path. In such cases, a redundant equipment grounding conductor should be installed. The panel has already rejected proposals to previous editions of the NEC to require separate equipment grounding conductors where equipment is subject to vibration, as everything is subject to some vibration, however minimal. Impairment of the grounding path is most likely when some strain is imposed on the connectors, which in turn is most likely when equipment must be allowed to move for some reason.

Panel Meeting Action: Reject

Panel Statement:

The present language in the Code covers the submitter's concerns. The proposed additional wording is redundant to the requirements of 250.134(B). The panel does not agree that flexibility is a concern only after installation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-69 Log #1248 NEC-P08 **Final Action: Accept in Principle**
(350-60)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
350.60 Grounding and Bonding. <u>LFMC shall be permitted as an equipment grounding conductor where installed in accordance with 250.118(7).</u>
Where used to connect equipment where flexibility is required, an equipment grounding conductor shall be installed.
Where required or installed, equipment grounding conductors shall be installed in accordance with 250.134(B).
Where required or installed, equipment bonding jumpers shall be installed in accordance with 250.102.

Substantiation:

The present Code ignores the permission given in Sections 250.134(A) and 250.118 to use the flexible metal conduit as a grounding means. An additional equipment grounding conductor must be installed only where flexibility of the conduit does not ensure a continued path to ground.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the panel action and statement on Proposal 8-71.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-70 Log #1897 NEC-P08 **Final Action: Reject**
(350-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
350.60 Grounding and Bonding. Where used to connect equipment where flexibility is required, an equipment grounding conductor shall be installed.
Where required or installed, equipment ~~grounding~~ bonding conductors shall be installed in accordance with 250.134(B).
Where required or installed, equipment bonding jumpers shall be installed in accordance with 250.102.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-71 Log #2805 NEC-P08 **Final Action: Accept in Principle in Part**
(350-60)

Submitter: Henry A. Jenkins, Wake County

Recommendation:

Add a new first sentence to 350.60 as follows:
LFMC shall be permitted as an equipment grounding conductor where installed in accordance with 250.118(7). Add the word "additional" in the existing first sentence (the new second sentence) after the word "an" and before the word "equipment."
Where used to connect equipment where flexibility is required, an additional equipment-grounding conductor shall be installed.

Substantiation:

The present code ignores the permission given in 250.134(A) and 250.118 to use the liquidtight flexible metal conduit as a grounding means. An additional equipment-grounding conductor must be installed only where flexibility of the conduit does not ensure a continued path to ground.

Panel Meeting Action: Accept in Principle in Part

Revise 350.60 to read as follows:
350.60 Grounding and Bonding. Where used to connect equipment where flexibility is required, an equipment grounding conductor shall be installed.
Where flexibility is not required, LFMC shall be permitted to be used as an equipment grounding conductor when installed in accordance with 250.118(7).
Where required or installed, equipment grounding conductors shall be installed in accordance with 250.134(B).
Where required or installed, equipment bonding jumpers shall be installed in accordance with 250.102.

Panel Statement:

The panel accepts in principle the proposed new first sentence. The revised text more clearly reflects the intent of the panel.
The word "additional" is rejected and would create confusion pertaining to redundant grounding paths. A redundant equipment grounding conductor is not required.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-72 Log #2869 NEC-P08 **Final Action: Reject**
(350-60)

Submitter: Wayne A. Lilly Bridgewater, VA

Recommendation:

Revise Section 350.60 so as to read as follows:
350.60 Grounding and Bonding. Where used to connect equipment where flexibility is required, an equipment grounding conductor shall be installed within the LFMC.
Where required or installed, equipment grounding conductors shall be installed in accordance with 250.134(B).
Where required or installed, equipment bonding jumpers shall be installed in accordance with 250.102.

Substantiation:

This section was added for those situations where the LFMC was being used as an equipment grounding conductor and flexibility was an issue. In this situation, there were reported cases where the LFMC became loose at its connector or the connector became loose. In either case, the equipment grounding conductor circuit was interrupted. The current language, along with the language in 250.102(E), permits a conductor to be installed from connector to connector on the outside of the LFMC. If one or both of the connectors become loose, the equipment ground path is interrupted. Adding the language "within the LFMC" requires the equipment grounding conductor to be installed within the LFMC. This will require the equipment grounding conductor to be connected ahead of the connector used to terminate the LFMC. If the connector becomes loose, the equipment grounding path is still intact.

Panel Meeting Action: Reject

Panel Statement:

The present language in the Code covers the submitter's concerns. The proposed additional wording is redundant to the requirements of 250.134(B).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-52 (Log #2868).

8-73 Log #242 NEC-P08 **Final Action: Accept**
(352-2)

Submitter: Jon Kurzer Pigeon, MI

Recommendation:

At the end of the definition of "Rigid Nonmetallic Conduit" add and cables so the definition will read as follows:
Rigid Nonmetallic Conduit (RNC). A nonmetallic raceway of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables.

Substantiation:

Cables are included in the definition of Rigid Metal Conduit, Intermediate Metal Conduit, and Electrical Metallic Tubing, but not Rigid Nonmetallic Conduit. Protection of cables from physical damage in wet and corrosive environments is an important application of Rigid Nonmetallic Conduit. For example, in 230.50(A)(3) schedule 80 PVC Rigid Nonmetallic Conduit is permitted to protect service cables from physical damage. Rigid Nonmetallic Conduit is often the material of choice to protect cables emerging from the ground according to 300.5(D)(1). Because of the corrosive conditions, Rigid Nonmetallic Conduit is also the material of choice to protect cables from physical damage in the corrosive conditions of livestock confinement areas. Circuits are frequently run with Type UF cable and protected with Rigid Nonmetallic Conduit when they travel to equipment where the cable can be damaged by machinery or livestock. The omission of the word "cables" leaves the use of RNC for the protection of cables in these conditions in doubt.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-74 Log #3026 NEC-P08 **Final Action: Reject**
(352-7 (New))

Submitter: William A. Wolfe, Steel Tube Institute of North America

Recommendation:

Add a new Section as follows:
352.7. Ampacity of Conductors. Where RNC is installed in thermal insulation, the conductor insulation rating shall be 90°C. The ampacity shall be in accordance with 310.15 but in no case shall the ampacity be de-rated less than the following:
(a) 1-3 conductors: 70% of values in Table 310.16
(b) 4-6 conductors: 50% of values in Table 310.16
(c) 7-9 conductors: 40% of values in Table 310.16

Substantiation:

We selected new Section 352.7 since it is consistent with Article 366 which includes a Section 366.7 Ampacity of Conductors.
In reviewing the changes that have occurred in the 2002 NEC for the permitted uses of ENT, we discovered that the safety issue of overheating of conductors has been overlooked for both ENT and RNC. Test data submitted by a major producer as substantiation for a 1999 Code proposal needs to be examined for its safety impact.
There is often thermal insulation inside walls and in concealed spaces of floor/ceiling assemblies. According to a 1996 UL Fact-Finding Report (File E73317, Project 96NK29786) for Lamson & Sessions/Carlon, when RNC is installed wrapped in thermal insulation both the conductors inside and the RNC reach temperatures in excess of insulation rated at 90 degrees C when the Ampacity is that specified by the NEC. UL had planned to use a test current of 80% of that number. They discovered that the ampacity had to be lowered to the following percentages of the NEC ampacity in order to not exceed a temperature of 90oC: Trade Size 1/2: 70%; Trade Sizes 3/4 - 1: 50%; Trade Size 2 - 40%. The UL Report compares results of unwrapped vs. wrapped RNC when the same tests currents are applied: there was as much as a 95% increase in raceway temperature and a 71% increase in the temperature of the conductor insulation in the wrapped samples.
We realize that installation in thermal insulation can differ according to many factors, and the response may not be as great as when RNC is wrapped in insulation. However, some of the tests came within 8 - 10 points of reaching the 60oC wire insulation limit with no wrap and with the substantially reduced ampacity. The NEC should specify these de-rating factors much as it has long required 90oC insulation for NM cable.
The requirement to use 90oC conductors is based on the fact that even with the substantial de-rating, all the conductors exceeded a temperature of 60oC in the thermal wrap test.
There is no doubt that without the suggested de-rating, temperatures will substantially deform the conduit and place more stress at support points as the temperatures sometimes can exceed the temperature in which nonmetallic conduit is permitted to be installed for similar reasons. This is of particular concern due to the possibility that recent changes may lead to more installation in metal stud construction. This information supplements 310.10 FPN (3) and aids enforcement.
The UL Fact Finding Report was referenced in Proposal 3-141 that the producer submitted for the 1999 NEC to allow the use of ENT in "other spaces used for environmental air" where wrapped in insulation (failed). The proposal included the de-rating factors shown above and the substantiation stated:
"The UL Fact Finding Report also describes the excessive conductor insulation temperatures that were recorded when the circuits were operated at the ampacities permitted by Note 8, Notes to Ampacity Tables of 0 to 2000 Volts. The proposal specifies the adjustment factors necessary to keep the conductor insulation temperature at acceptable levels, based on ampacities cited in the UL Fact Finding Report."
The Summary in the UL Fact Finding Report States that: The electrical heat tests performed on the ENT and RNMC wiring systems wrapped with insulation required an adjustment factor to reduce the current values necessary to bring the temperatures on the conductors below the 90oC insulation rating (See Table 3)." Table 3 lists the de-rating factors shown in our proposal above.
Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

The UL fact finding report defined a particular test for the addition of RNC and ENT for use in an environmental air-handling space. The testing in this fact finding report does not represent an actual installation or materials used with RNC and ENT when used with insulation within a structure. The submitter failed to provide the panel with technical documentation showing actual failures or safety-related problems in the field.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-74a Log #CP801 NEC-P08 **Final Action: Accept**
(352-10(G))

Submitter: Code-Making Panel 8

Recommendation:

Delete the second sentence of 352.10(G).
Add a FPN to 352.10(G) to read as follows:
FPN: Refer to Article 353 for High Density Polyethylene Conduit: Type HDPE Conduit.

Substantiation:

Revisions are made to correlate with the new Article 353 added by the panel action on Proposal 8-96.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-75 Log #733 NEC-P08 **Final Action: Reject**
(352-10(H))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise last sentence as follows:
The conduit bodies shall not contain devices other than splicing devices, or support fixtures or other equipment.

Substantiation:

The term "device" is defined in Article 100 and intended to apply wherever the term is used. A wire connector is a device. Intent should not be relied on for legal application when text can be made clear. The Style Manual states words and terms shall be specified and clear (3.3.4). The word devices is specific and clear.

Panel Meeting Action: Reject

Panel Statement:

The use of the term "devices" in this section is clearly intended to apply to wiring devices. Conduit bodies that are listed for the purpose may contain splices that are made in accordance with110.14.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-76 Log #276 NEC-P08 **Final Action: Accept in Principle**
(352-12)

Submitter: James M. Daly, General Cable

Recommendation:

In 352.12, delete the phrase "in the following locations." so the sentence reads "RNC shall not be used".

Substantiation:

Editorial revision to make the paragraphs that follow read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual. Also, (E) is not a location.

Panel Meeting Action: Accept in Principle

Revise the submitter's recommendation to read as follows:
Revise the lead sentence of 352.12 to read as follows:
352.12 Uses Not Permitted.
RNC shall not be used under the following conditions.
{The remainder of 352.12 is uneffected.}

Panel Statement:

The revised wording accomplishes the submitter's objective and retains wording consistent with 352.10.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

Comment on Affirmative:

DABE: They do not have to read as complete sentences according to 2.1.5.1 of the style manual.

8-77 Log #750 NEC-P08 (352-12(A)) **Final Action: Accept in Principle**

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text as follows:
RNC shall not be used in ~~the~~ (A) Hazardous (Classified) Locations (1) In hazardous locations except as permitted in 501.4(B)(3), 503.3(A), 504.20, 514.8 Exception No. 2, and 515.8.

Substantiation:

Edit. The first sentence relates to location, per se. There is no Exception for 501.4(B). Exception No. 2 for 514.8 should be noted for specificity. There is no need to refer to Class 1 Division1 locations specifically, they are covered by the heading for (A).

Panel Meeting Action: Accept in Principle

Revise 352.12(A) to read as follows:
(A) Hazardous (Classified) Locations.
(1) In hazardous (classified) locations, except as permitted in 503.3(A), 504.20, 514.8 Exception No. 2, and 515.8
(2) In Class I, Division 2 locations, except as permitted in 501.4(B)(3)

Panel Statement:

The revised text more clearly conveys the changes and meets the intent of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-78 Log #277 NEC-P08 (352-12(E)) **Final Action: Accept in Principle**

Submitter: James M. Daly, General Cable

Recommendation:

Revise 352.12(E) as follows:
(E) Insulation Temperature Limitations. For conductors or multiconductor cables whose insulation temperature limitations would exceed those for which the conduit is listed.
Exception: Conductors or multiconductor cables rated at a temperature higher than the RNC listed temperature rating shall be permitted to be installed in RNC provided they are not operated at a temperature higher than the RNC listed temperature rating.

Substantiation:

There are numerous conductors and multiconductor cables that are rated at a higher temperature than the RNC listed temperature rating. The exception will permit higher rated conductors or cables to be installed in RNC provided they are not operated at a temperature higher than the RNC listed temperature rating. The temperature rating of the RNC will not be exceeded, equivalent safety will be provided, and other products will not be prohibited from being installed in RNC.

Panel Meeting Action: Accept in Principle

Revise 352.12(E) as follows:
(E) Insulation Temperature Limitations. For conductors or cables whose insulation temperature limitations would exceed those for which the conduit is listed.
Exception: Conductors or cables rated at a temperature higher than the RNC listed temperature rating shall be permitted to be installed in RNC provided they are not operated at a temperature higher than the RNC listed temperature rating.

Panel Statement:

The panel removed the word "multiconductor" because the word "cable" includes multiconductor cable. The revised text meets the intent of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: The added Exception should have been underlined. The conductors in a raceway should not have a temperature rating higher than the raceway. They could be operated accidentally at their temperature rating.

8-79 Log #1249 NEC-P08 (352-12(E)) **Final Action: Accept in Principle**

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

(E) Insulation Temperature Limitations. For conductors whose insulation temperature limitations would exceed those for which the conduit is listed. 105 degree C Medium Voltage Conductors or Cables (Type MV) are permitted to be installed in RNC that is approved and marked for 90 degree C condutors.

Substantiation:

Most wire and cable manufacturers no longer mark Type MV conductors or cables for 90 degrees C since the conductors meet the 105 degree C requirements and are marked for the higher temperature rating. The code currently prohibits the installation of the 105 Type MV conductors and cables since they are rated higher than the 90 degree C RNC temperature rating.

The temperature rating of the conduit will not be exceeded since the users do not operate MV conductors or cables above 90 degrees C. The rated temperature is based upon the rating of the insulation and jacketing material used in the construction of the cable, not the operational temperature.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to panel action and statement on Proposal 8-78.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-78 (Log #277).

8-80 Log #15 NEC-P08 **Final Action: Accept in Principle**
(352-12(E) Exception (New))

NOTE: The following proposal consists of Comment 8-53 on Proposal 8-255 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 8-255 was:
Revise Article 347 to read as follows:

[Text of (May 2001) Proposal 8-255 is shown on page 2318]

Submitter: James M. Daly, BICC General

Recommendation:

The proposal should continue to be accepted in principle and the following exception should be added to 347-12(e):
Exception: Insulated conductors or multiconductor cables rated at a higher temperature than the RNC listed temperature rating shall be permitted to be installed in RNC provided they are not operated at a temperature higher than the RNC listed temperature rating.

Substantiation:

This exception will resolve a conflict within the code.
Most wire and cable manufacturers no longer mark Type MV conductors for 90°C since the conductors meet the 105°C requirements and are marked for the higher temperature rating. Without the exception, the code currently prohibits the installation of 105°C Type MV insulated conductors and cables in RNC since they are rated higher than the RNC. The exception will permit the higher rated conductors or cables to be installed in RNC provided they are not operated at a temperature higher than the RNC temperature rating.
The temperature rating of the RNC will not be exceeded, equivalent safety will be provided, and the product will not be prohibited from being used in RNC.
Except for electric utilities in major cities, users do not operative MV conductors or cables above 90°C anyhow so the restrictions of limiting the conductor operating temperature to the temperature rating of the RNC will not require any change from current practice.
Also, there are other conductors and cables in the NEC that are rated higher than 90°C such as PLTC which is rated 105°C and yet, because of the power limited requirements, can never reach the rated temperature. The rated temperature is based upon the rating of the insulation and the jacketing material used in the construction, not the operational temperature. There is no reason to exclude these conductors and cables from being installed in RNC provided the RNC temperature rating is not exceeded.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to panel action and statement on Proposal 8-78.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-78 (Log #277).

8-81 Log #526 NEC-P08 **Final Action: Accept**
(352-12(F))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(F) Theaters and Similar Locations. In theaters and similar locations, except as provided in 518.4 and 520.5 ~~Articles 518 and 520~~.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-82 Log #3174 NEC-P08 **Final Action: Reject**
(352-12(G) (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass Electrical Code Adv. Committee

Recommendation:

Add a new (G) to read as follows:
(G) High-Rise Buildings. Where used in buildings more than 21 m (70 ft) above mean grade, rigid nonmetallic conduit shall not be used unless the building is protected by an approved fire sprinkler system(s) installed on all floors as a complete system, or the conduit is concealed behind a thermal barrier as described in 362.10(2) or 362.10(5), or the conduit is encased in not less than 50 mm (2 in.) of concrete.

Substantiation:

This proposal removes a technical inconsistency in the Code, since rigid nonmetallic conduit constructed of polyvinyl chloride is the identical material as used in Electrical Nonmetallic Tubing (ENT). ENT, with a lower volume of nonmetallic material per comparable unit length, now has a more severe restriction.
In the prior cycle, CMP 8 suggested that a technical inconsistency was inadequate substantiation for a change in the Code. Nevertheless, certain conclusions can be legitimately drawn from the field experience with comparable products. Perhaps the thirty-year record of safe use indicates that ENT could benefit from similar provisions? The restriction should not be confined to the wiring method with the largest potential market share.

Panel Meeting Action: Reject

Panel Statement:

The proposal does not remove a technical inconsistency in the Code but adds a restriction to the use of RNC without a technical substantiation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-83 Log #588 NEC-P08 **Final Action: Accept**
(352-22)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
Number of Conductors. The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is ~~permitted~~ not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

The second paragraph of this section was added for the 2002 NEC. The substantiation for adding this provision was that... "The proposed language clarifies that cables, where permitted elsewhere in the Code, are allowed to be used in a raceway." Cable articles are structured so that installation in raceways is not prohibited. The proposed revision will correlate the desired clarification with the cable articles, which do not specifically permit installation in raceways but instead do not prohibit installation in raceways.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-84 Log #1205 NEC-P08 **Final Action: Accept**
(352-22)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
352.22 Number of Conductors.
The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is not prohibited ~~permitted~~ by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

This change agrees with the panel's intent and substantiation for placing this language in the 2002 code. It was the panel's intent to allow cables in raceways unless prohibited in the respective cable article.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-85 Log #1250 NEC-P08 **Final Action: Accept in Principle**
(352-24)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

352.24 Bends — How Made. Bends shall be made so that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. Field bends shall be made only with bending equipment identified for the purpose. The radius of the curve to the centerline of such bends shall not be less than shown in Table 300.18(C) ~~344.24~~, column "Other Bends."

Substantiation:

This is a companion proposal to move Table 344.24 from Article 344 to Article 300. All raceway Articles refer to this table for the radius of conduit or tubing bends. It is appropriate that this table belongs in this general section.

Panel Meeting Action: Accept in Principle

In the submitter's recommendation, change the reference "Table 300.18(C)" to "Table 2, Chapter 9."

Panel Statement:

The panel agrees that the table should appear in a more general location. Relocating the table to Chapter 9 will allow retention of the table under the purview of CMP 8.

CMP 8 recommends that the TCC review the placement (number) of the table in Chapter 9 for consistency in the overall Code organization and panel scope.

Refer to Proposal 8-24a (Log #CP800).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: See my Explanation of Negative on Proposal 8-10 (Log #1241).

8-86 Log #1095 NEC-P08 **Final Action: Reject**
(352-30)

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence.
All support straps, clips, hangers, and similar support hardware shall be identified for the purpose.

Substantiation:

Conduit straps, clips, hangers may not be considered "fittings".
According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-13.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-87 Log #345 NEC-P08 **Final Action: Reject**
(352-30(B))

Submitter: Glenn W. Zieseniss Crown Point, IN

Recommendation:

Revise 3rd sentence text to read:
(B) Horizontal runs of RNC supported by openings <u>which horizontal opening is not larger than 3 times the nominal inside diameter of the raceway</u> through framing members at intervals not exceeding those in Table 352.30(B) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.

Substantiation:

Some openings may be more than 10 feet in width. I have seen several installations where the raceways looked like snakes between termination points in the roof trusses. The 3 times the nominal ID of the raceway of the opening in the framing members would constrain the raceway to an appearance as required by NEC 110.12 (1st sentence). Workers installing other items or equipment can easily deflect the raceway either purposely or accidentally while doing their work. Painters or persons installing advertisements may disturb the electrical raceway position. The 3 times the nominal ID would allow some minor deflections of the raceway if the framing member openings are not in a straight line.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-17.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-88 Log #968 NEC-P08 **Final Action: Reject**
(352-30(B))

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Add at end:
<u>Where securing is impracticable, lengths of RNC that will be supported by resting on an essentially continuous surface, or on structural members spaced no further apart than permitted by Table 352.30(B), RNC shall be permitted to be fished.</u>

Substantiation:

As presently worded, it not clear, and hence inconsistently permitted that support can consist of anything other than being secured or passing through a hole. It specifically is quite unclear that fishing is permitted, and that resting on the ground, for example, can be used as a means of support. In other articles where fishing is permitted, it tends to be explicitly mentioned. Consider RNC run under an existing, low-to-the-ground deck. This corresponds to a proposal for Section 300.11.

Panel Meeting Action: Reject

Panel Statement:

The submitter gives insufficient substantiation for the proposed change. This proposal would not adequately support and/or secure the raceway.
The panel disagrees that the present wording is not clear.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-89 Log #209 NEC-P08 **Final Action: Accept**
(Table 352-44(A) and Table 352-44(B))

Submitter: Scott Merrick Holt, MI

Recommendation:

Place a double vertical line between the length change for degrees C and degrees F so there will be a clear separation between the two parts of table 352.44(A) and also of table 352.44(B).

Substantiation:

Reading these tables is confusing with two sets of data in one table. There needs to be an obvious separation between the metric part of the table and the inch-pound part of the table.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-90 Log #3529 NEC-P08 **Final Action: Reject**
(Table 352-44(A) & Table 352.44 (B))

Submitter: Glen Cooper

Recommendation:

Change the coefficient of thermal expansion of PVC type rigid nonmetallic conduit in the title of Table 352.44(A) to read as follows:
Table 352.44(A) Expansion Characteristics of PVC Rigid Nonmetallic conduit Coefficient of Thermal Expansion = ~~6.084 x 10^{-5} mm/mm/°C(3.38 x 10-5 in./in./°F)~~ 0.06084 mm/m/°C (0.04056 in./100 ft/°F)
Table 352.44(B) Expansion characteristics of Reinforced Thermosetting Resin Conduit (RTRC) Coefficient of Thermal Expansion = ~~2.7 x 10^{-5} mm/mm/°C(1.5 x 10-5 in./in./°F)~~ 0.0270 mm/m/°C (0.0180 in./100 ft/°F).

Substantiation:

The coefficients of thermal expansion need to be put in a form that electricians and inspectors can comprehend. Put the coefficients on the same basis as the tables. The values for temperature difference in degrees C are so course that they may need to calculate the change in length such as a change in temperature of 60°F which is 33.3°C. The change in length of PVC Rigid Nonmetallic Conduit in metric will be 33.3°C x 0.06084 mm/m/°C = 2.03 mm/m.

Panel Meeting Action: Reject

Panel Statement:

The current conversion factor was dictated by the TCC Metric Conversion Task Group and was agreed upon by representatives of all industry as the best way to achieve comprehension.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-91 Log #2998 NEC-P08 **Final Action: Reject**
(352-48)

Submitter: Goran Haag, Champion Fiberglass, Inc.

Recommendation:

Add following: "Where the length change, due to thermal expansion and contraction and in accordance with Table 352.44(A) or (B), is expected to be 6 mm (1/4 in.) or greater in a straight run, all joints need to be bonded/permanent made."

Substantiation:

There have been many instances where installations have been made with gasket joints. Due to thermal expansion/contraction, the joints have later pulled apart, thereby causing potential problems as well as violating the National Electrical Code.
Due to the considerable larger pull out strength for a bonded/permanent joint compared to a gasket joint, this will elevate this problem.

Panel Meeting Action: Reject

Panel Statement:

Expansion is covered in 352.44. Section 352.48 only applies to joints and they are required to be joined in approved manner.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-92 Log #527 NEC-P08 **Final Action: Accept**
(352-60)

Submitter: James M. Daly, General Cable

Recommendation:

Delete text as follows:
Where equipment grounding is required ~~by Article 250~~, a separate equipment grounding conductor shall be installed in the conduit.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified." 90.3 states that Chapters 1, 2, 3, and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-93 Log #1251 NEC-P08 **Final Action: Accept**
(352-60)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

352.60 Grounding. Where equipment grounding is required ~~by Article 250~~, a separate equipment grounding conductor shall be installed in the conduit.

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ‘‘grounded in accordance with Article 250’’ unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-94 Log #1898 NEC-P08 **Final Action: Reject**
(352-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
352.60 Grounding. Where equipment grounding is required by Article 250, a separate equipment ~~grounding~~ bonding conductor shall be installed in the conduit.
Exception No. 1: As permitted in 250.134(B), Exception No. 2, for dc circuits and 250.134(B), Exception No. 1, for separately run equipment ~~grounding~~ bonding conductors.
Exception No. 2: Where the grounded conductor is used to ground equipment as permitted in 250.142.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-95 Log #2212 NEC-P08 **Final Action: Reject**
(352-60)

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
352.60 Grounding. Where equipment grounding is required by Article 250, a separate equipment grounding conductor shall be installed in the conduit.
Exception No. 1: As permitted in 250.134(B), Exception No. 2, for dc circuits and 250.134(B), Exception No. 1, for separately run equipment grounding conductors.
Exception No. 2: Where the ~~grounded~~ earth conductor is used to ground equipment as permitted in 250.142.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated it's desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The proposed change does not improve the consistency or usability of the Code. The term affected by the proposal is more in the purview of CMP 5.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-96 Log #1252 NEC-P08 **Final Action: Accept in Principle**
(353 (New))

TCC Action:

The Technical Correlating Committee advises that assignment of new Articles and Article Scope Statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee "Accepts" the Panel Action. The Technical Correlating Committee further directs the panel to revisit the Fine Print Note in 353.10 and make it a complete sentence as to what is being referenced. This action will be considered by the panel as a public comment.

For this issue relating to "Uses Permitted", see the Technical Correlating Committee Note on Proposal 8-102.

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Add a new Article to read as follows:

ARTICLE 353 High Density Polyethylene Conduit: Type HDPE Conduit

I. General

353.1 Scope. This article covers the use, installation, and construction specifications for High Density Polyethylene Conduit (HDPE Conduit) and associated fittings.

353.2 Definition. High Density Polyethylene Conduit (HDPE Conduit). A nonmetallic raceway of circular cross section, with associated couplings, connectors, and fittings for the installation of electrical conductors.

353.6 Listing Requirements. HDPE Conduit and associated fittings shall be listed.

II. Installation

353.10 Uses Permitted. The use of HDPE Conduit shall be permitted under the following conditions.

(A) Underground Installations. For underground installations, see 300.5 and 300.50. Conduits listed for the purpose shall be permitted to be installed underground in continuous lengths from a reel.

(B) Corrosive Influences. In locations subject to severe corrosive influences as covered in 300.6 and where subject to chemicals for which the materials are specifically approved.

(C) Cinders. In cinder fill.

(D) Wet Locations. In installations underground direct burial or encased in concrete where the entire conduit system including boxes and fittings used therewith shall be installed and equipped so as to prevent water from entering the conduit.

353.12 Uses Not Permitted. HDPE Conduit shall not be used in the following locations.

(A) Exposed. HDPE Conduit shall not be used exposed.

(B) Within a building.

(C) Hazardous (Classified) Locations. HDPE Conduit shall not be used in hazardous (classified) locations, except as permitted in 504.20.

(D) Ambient Temperatures. Where subject to ambient temperatures in excess of 50°C (122°F) unless listed otherwise.

(E) Insulation Temperature Limitations. For conductors whose insulation temperature limitations would exceed those for which the conduit is listed. 105 degree C Medium Voltage Conductors or Cables (Type MV) are permitted to be installed in HDPE Conduit that is approved and marked for 90 degree C condutors.

353.20 Size.

(A) Minimum. HDPE Conduit smaller than metric designator 16 (trade size _) shall not be used.

(B) Maximum. HDPE Conduit larger than metric designator 155 (trade size 6) shall not be used.

FPN: The trade sizes and metric designators are for identification purposes only and do not relate to actual dimensions. See 300.1(C).

353.22 Number of Conductors. The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.

Cables shall be permitted to be installed where such use is not prohibitive by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

353.24 Bends — How Made. Bends shall be made so that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment, and the radius of the curve to the centerline of such bends shall not be less than shown in Table 354.24.

353.26 Bends — Number in One Run. There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.

353.28 Trimming. All cut ends shall be trimmed inside and outside to remove rough edges.

353.46 Bushings. Where a conduit enters a box, fitting, or other enclosure, a bushing or adapter shall be provided to protect the wire from abrasion unless the box, fitting, or enclosure design provides equivalent protection.

FPN: See 300.4(F) for the protection of conductors 4 AWG and larger at bushings.

353.48 Joints. All joints between lengths of conduit, and between conduit and couplings, fittings, and boxes, shall be made by an approved method.

353.56 Splices and Taps. Splices and taps shall be made in accordance with 300.15.

353.60 Grounding. Where equipment grounding is required, a separate equipment grounding conductor shall be installed in the Conduit.

Exception No. 1: As permitted in 250.134(B), Exception No. 2, for dc circuits and 250.134(B), Exception No. 1, for separately run equipment grounding conductors.

Exception No. 2: Where the grounded conductor is used to ground equipment as permitted in 250.142.

III. Construction Specifications

353.100 Construction. HDPE Conduit shall be composed of suitable nonmetallic material that is resistant to moisture and chemical atmospheres. The material shall be acceptably resistant to moisture and corrosive agents and shall be of sufficient strength to withstand abuse, such as by impact and crushing, in handling and during installation. Where intended for direct burial, without encasement in concrete, the material shall also be capable of withstanding continued loading that is likely to be encountered after installation.

353.120 Marking. Each length of HDPE CONDUIT shall be clearly and durably marked at least every 3 m (10 ft) as required in the first sentence of 110.21. The type of material shall also be included in the marking unless it is visually identifiable. The conduit shall be marked so that markings shall be sufficiently durable to remain legible until the material is installed.

Substantiation:

This is a NEW Article for the National Electrical Code. It seems appropriate that this Article is placed after Rigid Nonmetallic Conduit and before Nonmetallic Underground Conduit with Conductors. HDPE Conduit is currently a listed product that is restricted in its uses and is sometimes substituted as a Rigid Nonmetallic Conduit and used aboveground. This new Article will clarify the HDPE Conduits installations and construction specifications. Annex C would not require to be revised since Table C10 and C10(A) already include HDPE Conduit.

Panel Meeting Action: Accept in Principle

Add a new article to read as follows:

ARTICLE 353 high density polyethylene conduit: Type HDPE Conduit

I. General

353.1 Scope. This article covers the use, installation, and construction specifications for high density polyethylene (HDPE) conduit and associated fittings.

353.2 Definition. High Density Polyethylene (HDPE) conduit. A nonmetallic raceway of circular cross section, with associated couplings, connectors, and fittings for the installation of electrical conductors.

353.6 Listing Requirements. HDPE conduit and associated fittings shall be listed.

II. Installation

353.10 Uses Permitted. The use of HDPE conduit shall be permitted under the following conditions:

(1) In discrete lengths or in continuous lengths from a reel.

(2) In locations subject to severe corrosive influences as covered in 300.6 and where subject to chemicals for which the conduit is listed.

(3) In cinder fill.

(4) In direct burial installations in earth or concrete.

FPN: Refer to 300.5 and 300.50.

353.12 Uses Not Permitted. HDPE conduit shall not be used under the following conditions:

(1) Where exposed.

(2) Within a building.

(3) In hazardous (classified) locations, except as permitted in 504.20.

(4) Where subject to ambient temperatures in excess of 50°C (122°F) unless listed otherwise.

(5) For conductors or cables whose insulation temperature limitations would exceed those for which the conduit is listed.

Exception: Conductors or cables rated at a temperature higher than the HDPE conduit listed temperature rating shall be permitted to be installed in HDPE conduit provided they are not operated at a temperature higher than the HDPE conduit listed temperature rating.

353.20 Size.

(A) Minimum. HDPE conduit smaller than metric designator 16 (trade size 1/2) shall not be used.

(B) Maximum. HDPE conduit larger than metric designator 103 (trade size 4) shall not be used.

FPN: The trade sizes and metric designators are for identification purposes only and do not relate to actual dimensions. See 300.1(C).

353.22 Number of Conductors. The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.

Cables shall be permitted to be installed where such use is not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

353.24 Bends — How Made. Bends shall be made so that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment, and the radius of the curve to the centerline of such bends shall not be less than shown in Table 354.24.

353.26 Bends — Number in One Run. There shall not be more than the equivalent of four quarter bends (360 degrees total)

between pull points, for example, conduit bodies and boxes.

353.28 Trimming. All cut ends shall be trimmed inside and outside to remove rough edges.

353.46 Bushings. Where a conduit enters a box, fitting, or other enclosure, a bushing or adapter shall be provided to protect the wire from abrasion unless the box, fitting, or enclosure design provides equivalent protection.

FPN: See 300.4(F) for the protection of conductors 4 AWG and larger at bushings.

353.48 Joints. All joints between lengths of conduit, and between conduit and couplings, fittings, and boxes, shall be made by an approved method.

353.56 Splices and Taps. Splices and taps shall be made in accordance with 300.15.

353.60 Grounding. Where equipment grounding is required, a separate equipment grounding conductor shall be installed in the conduit.

Exception No. 1: As permitted in 250.134(B), Exception No. 1, for separately run equipment grounding conductors, and 250.134(B), Exception No. 2, for dc circuits.

Panel Statement:

Changes are made to the submitter's recommendation to more closely follow the NEC Style Manual, and to correlate with the structure of other articles. The revised text meets the intent of the submitter.

It is recommended that the TCC consider the proposed numbering sequence of this article as well as the article scope.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

WAGNER: The submitter has recommended the creation of an Article based upon the material from which the product is made, rather than upon differences in construction or intended use. The creation of a separate Article based solely upon material deviates from the precedent established for other wiring methods and introduces the potential for confusion when considered alongside 352, Rigid Nonmetallic Conduit. Rather than base this Article upon material differences, it is suggested that the proposed article be revised to address Coilable Nonmetallic Conduit, regardless of the material from which it is constructed.

8-97 Log #278 NEC-P08 (354-10) **Final Action: Reject**

Submitter: James M. Daly, General Cable

Recommendation:

Delete "in the following" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Reject

Panel Statement:

The NEC Style Manual allows the use of single words, phrases, or sentences in lists. The present text complies with the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-98 Log #279 NEC-P08 (354-12) **Final Action: Reject**

Submitter: James M. Daly, General Cable

Recommendation:

Delete "in the following" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Reject

Panel Statement:

The NEC Style Manual allows the use of single words, phrases, or sentences in lists. The present text complies with the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-99 Log #528 NEC-P08 **Final Action: Accept**
(354-60)

Submitter: James M. Daly, General Cable

Recommendation:

Delete the text indicated:
Where equipment grounding is required ~~by Article 250~~, an assembly containing a separate equipment grounding conductor shall be used.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."
90.3 states that Chapters 1, 2, 3, and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-100 Log #1253 NEC-P08 **Final Action: Accept**
(354-60)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

354.60 Grounding. Where equipment grounding is required ~~by Article 250~~, an assembly containing a separate equipment grounding conductor shall be used.

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ''grounded in accordance with Article 250'' unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-101 Log #1899 NEC-P08 **Final Action: Reject**
(354-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
354.60 Grounding. Where equipment grounding is required by Article 250, an assembly containing a separate equipment ~~grounding~~ bonding conductor shall be used.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-102 Log #2042 NEC-P08 (356-10) **Final Action: Reject**

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the text in Section 356.10 as follows:

~~356.10 Uses Permitted.~~

~~LFNC shall be permitted to be used in exposed or concealed locations for the following purposes:~~

~~FPN:Extreme cold may cause some types of nonmetallic conduits to become brittle and therefore more susceptible to damage from physical contact.~~

~~(1) Where flexibility is required for installation, operation, or maintenance~~

~~(2) Where protection of the contained conductors is required from vapors, liquids, or solids~~

~~(3) For outdoor locations where listed and marked as suitable for the purpose~~

~~(4) For direct burial where listed and marked for the purpose~~

~~(5) Type LFNC-B shall be permitted to be installed in lengths longer than 1.8 m (6 ft) where secured in accordance with 356.30~~

~~(6) Type LFNC-B as a listed manufactured prewired assembly, metric designator 16 through 27 (trade size 1/2 through 1) conduit~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

The sections for "Uses Permitted" and "Uses Not Permitted" provide a valuable source of information. To remove "Uses Permitted" does not enhance uniform interpretation and usability.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-103 Log #281 NEC-P08 (356-12) **Final Action: Reject**

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Reject

Panel Statement:

The NEC Style Manual allows the use of single words, phrases, or sentences in lists. The present text complies with the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-104 Log #2024 NEC-P08 (356-12) **Final Action: Reject**

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Revise 356.12 to read as follows:
356.12 Uses Not Permitted. LFNC shall not be used under the following conditions or in the following locations:
FPN: Extreme cold may cause some types of nonmetallic conduits to become brittle and therefore more susceptible to damage from physical contact.
(1) For installations where subject to physical damage.
(2) For outdoor locations unless listed and marked as suitable for the purpose.
(3) For direct burial unless listed and marked for the purpose.
(4) For a listed manufactured prewired assembly in other than metric designator 16 through 27 (trade size _ through 1) conduit sizes.
(5) For installations where any combination of ambient and conductor temperatures is in excess of that for which the LFNC is approved.
(6) For installations where the contained conductors are in excess of 600 volts, nominal.
(7) In lengths longer than 1.8 m (6 ft), except as permitted by 356.100(5) or where a longer length is approved as essential for a required degree of flexibility.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-105 Log #313 NEC-P08 **Final Action: Accept**
(356-12(3))

Submitter: Ryan Beggs, Rite-Hite Doors

Recommendation:

Revise text to read as follows:
"In lengths longer than 1.8 m (6 ft), except as permitted by ~~356.100(5)~~ 356.10(5) or where a longer length is approved as essential for a required degree of flexibility.

Substantiation:

356.100(5) does not exist. 356.10(5) provides the exception.

Panel Meeting Action: Accept

Panel Statement:

The panel notes that this change was corrected in Errata No. 17 (dated 1-18-02) to NFPA 70-2002.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-106 Log #683 NEC-P08 **Final Action: Accept in Part**
(356-12(4)(5) (New))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text to read as follows:
356.12(4): Where the operating voltage of the contained conductors is in excess of 600 volts, nominal, except as permitted in 600.32(A).
Add text to read as follows:
356.12 (5) In any hazardous (classified) location other than as permitted in 501.4(B), 502.4(A) and (B), 503.3(A), and 504.20.

Substantiation:

Proposed (4) is to clarify that circuit voltage and not insulation rating is intended; conductors rated over 600 volts are not prohibited for 600 volts or less circuits. A reference to 600.32(A) would be helpful to Code users. Inclusion of hazardous (classified) locations follows the format used with other wiring methods, e.g., 320.12, 322.12, 324.12, 348.12, 360.12, 368.4, 278.12, and 334.12, etc.

Panel Meeting Action: Accept in Part

The proposed item (5) is accepted.
The proposed revision to item (4) that adds the word "operating" is rejected.
The proposed language "except as permitted in 600.32(A)" is rejected.

Panel Statement:

The language regarding signs over 600 volts was removed during the last Code cycle as a result of the panel action to accept 2002 Proposal 8-350. The substantiation for that proposal was "This Section 600-32(a) refers to neon secondary circuit conductors only and not electric signs. The reference to electric signs would appear to address the primary circuit used to energize a manufactured product which can be or is listed and labeled. We are not aware of any signs that require more than 600 volts to energize. Therefore, the exception should be deleted to clarify any misinterpretation between secondary high voltage conductors and primary service voltage needs. This Section also conflicts with Section 300-37 for wiring requirements for over 600 volts. Also conflicts with Section 90-3 which states that Chapters 1 through 4 apply generally to all these Sections and any exceptions should occur in Article 600 only. Also Section 351-23(b)(4) now states that 600 volts is not permitted
and that brings Section 300-37 back into agreement with Section
90-3."

The term "opertating" is not accepted because the present wording does not limit the insulation to less than 600 volts.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-107 Log #589 NEC-P08 **Final Action: Accept**
(356-22)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
Number of Conductors. The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is ~~permitted~~ not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

The second paragraph of this section was added for the 2002 NEC. The substantiation for adding this provision was that... "The proposed language clarifies that cables, where permitted elsewhere in the Code, are allowed to be used in a raceway." Cable articles are structured so that installation in raceways is not prohibited. The proposed revision will correlate the desired clarification with the cable articles, which do not specifically permit installation in raceways but instead do not prohibit installation in raceways.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-108 Log #1206 NEC-P08 **Final Action: Accept**
(356-22)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
362.22 Number of Conductors.
The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is not prohibited ~~permitted~~ by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

This change agrees with the panel';s intent and substantiation for placing this language in the 2002 code. It was the panel's intent to allow cables in raceways unless prohibited in the respective cable article.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-109 Log #1254 NEC-P08 (356-24) **Final Action: Accept in Principle**

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

356.24 Bends — How Made. Bends in conduit shall be made so that the conduit is not damaged and the internal diameter of the conduit is not effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment. The radius of the curve to the centerline of any bend shall not be less than shown in Table 300.18(C) ~~344.24~~ using the column "Other Bends."

Substantiation:

This is a companion proposal to move Table 344.24 from Article 344 to Article 300. All raceway Articles refer to this table for the radius of conduit or tubing bends. It is appropriate that this table belongs in this general section.

Panel Meeting Action: Accept in Principle

In the submitter's recommendation, change the reference "Table 300.18(C)" to "Table 2, Chapter 9."

Panel Statement:

The panel agrees that the table should appear in a more general location. Relocating the table to Chapter 9 will allow retention of the table under the purview of CMP 8.

CMP 8 recommends that the TCC review the placement (number) of the table in Chapter 9 for consistency in the overall Code organization and panel scope.

Refer to Proposal 8-24a (Log #CP800).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: See my Explanation of Negative on Proposal 8-10 (Log #1241).

8-110 Log #1089 NEC-P08 (356-30 (New)) **Final Action: Reject**

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence as follows:
All support straps, clips, hangers, and similar support hardware shall be identified for the purpose.

Substantiation:

Conduit straps, clips, hangers may not be considered "fittings".

According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-13.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-111 Log #1255 NEC-P08 (356-30) **Final Action: Accept in Principle**

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

356.30 Securing and Supporting. Type LFNC-B shall be securely fastened and supported in accordance with one of the following:

(a) The conduit shall be securely fastened at intervals not exceeding 3 ft (914 mm) and within 12 in. (305 mm) on each side of every outlet box, junction box, cabinet, or fitting when installed in lengths longer than 6 feet.

(b) Securing and supporting of the conduit shall not be required where it is fished, installed in lengths not exceeding 3 ft (914 mm) at terminals where flexibility is required, or where installed in lengths not exceeding 6 ft (1.83 m) from a fixture terminal connection for tap conductors to lighting fixtures as permitted in Section 410-67(c).

(c) Horizontal runs of liquidtight flexible nonmetallic conduit supported by openings through framing members at intervals not exceeding 3 ft (914 mm) and securely fastened within 12 in. (305 mm) of termination points shall be permitted.

Substantiation:

This proposal is for clarification. The section on securing and supporting was added in the 1996 NEC when LFNC-B was permitted to be used in lengths longer than 6 feet. Prior to 96 there was not a securing or supporting requirement because LFNC fittings are evaluated and listed as appropriate fitting to support to the raceway in lengths 6 feet or less. Only type LFNC-B is permitted to be installed in lengths longer than 6 feet.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the panel action on Proposal 8-112, which meets the intent of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-112 Log #2327 NEC-P08 (356-30(1)) **Final Action: Accept**

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA) / Rep. NEMA

Recommendation:

Add new text as follows:

356.30 Securing and Supporting. Type LFNC-B shall be securely fastened and supported in accordance with one of the following:

(1) The conduit shall be securely fastened at intervals not exceeding 900 mm (3 ft) and within 300 mm (12 in.) on each side of every outlet box, junction box, cabinet, or fitting when installed in lengths longer than 1.8 m (6 ft).

(2) Securing and supporting of the conduit shall not be required where it is fished, installed in lengths not exceeding 900 mm (3 ft) at terminals where flexibility is required, or where installed in lengths not exceeding 1.8 m (6 ft) from a luminaire (fixture) terminal connection for tap conductors to luminaires (lighting fixtures) permitted in 410.67(C).

(3) Horizontal runs of LFNC supported by openings through framing members at intervals not exceeding 900 mm (3 ft) and securely fastened within 300 mm (12 in.) of termination points shall be permitted.

Substantiation:

This proposal is for clarification. The section on securing and supporting was added in the 1996 NEC when LFNC-B was permitted to be used in lengths longer than 6 feet. Prior to 1996 there was not a securing or supporting requirement because LFNC fittings are evaluated and listed as appropriate fittings to support the raceway in lengths 6 feet or less. Only type LFNC-B is permitted to be installed in lengths longer than 6 feet.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-113 Log #344 NEC-P08 **Final Action: Reject**
(356-30(4))

Submitter: Glenn W. Zieseniss Crown Point, IN

Recommendation:

Revise text to read:
(4) Horizontal runs of LFNC supported by openings which horizontal opening is not larger than 6 times the nominal inside diameter of the raceway through framing members at intervals not exceeding 900 mm (3 ft) and securely fastened within 300 mm (12 in.) of termination points shall be permitted.

Substantiation:

Some openings may be more than 10 feet in width. I have seen several installations where the raceways looked like snakes between termination points in the roof trusses. The 3 times the nominal ID of the raceway of the opening in the framing members would constrain the raceway to an appearance as required by NEC 110.12 (1st sentence). Workers installing other items or equipment can easily deflect the raceway either purposely or accidentally while doing their work. Painters or persons installing advertisements may disturb the electrical raceway position. The 3 times the nominal ID would allow some minor deflections of the raceway if the framing member openings are not in a straight line.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-17.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-114 Log #20 NEC-P08 (356-30(B)) **Final Action: Accept in Principle**

NOTE: The following proposal consists of Comment 8-80 on Proposal 8-328 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 8-328 was:
Separate existing Article 351 into two distinct articles; Liquidtight Flexible Metal Conduit and Liquidtight Flexible Nonmetallic Conduit. This proposal contains the proposed text for Liquidtight Flexible Nonmetallic Conduit. See companion proposal for Liquidtight Flexible Metallic Conduit, Article 351A.

Submitter: Joseph A. Ross, Ross Seminars

Recommendation:

Change 3YY.30(1) to 3YY.30(a) and revise the third phrase of (b) as follows:
..., or where installed in lengths not exceeding 6-feet (1.83m) from an outlet for connection within an accessible ceiling to lighting fixtures or equipment.

Substantiation:

This revised third phrase of (b) is not to be considered new material. Note: The proper text presently appears in Sections 333-7 (b)(3), 334-10(b), and 336-18 Exception No. 2. This Comment corrects an omission. The phrase is revised, as LFNC is not permitted to contain hi-temp conductors as addressed by Section 410-67(c). See companion Comments for Sections 331-30(a) Exception, 350-30 Exception and 3XX(51)-30(a) Exception No. 4.

The omission must be corrected as 6 foot lengths (whips) are presently manufactured and listed and in common use today. Some inspectors have rejected their use.

The term "whip" is not defined in the NEC, but everyone knows what a "whip" is and takes for granted that flexible raceways and cables are permitted for this use. However, many misinterpret that Section 410-67 (c) addresses "whips" and believe the method is covered. It is not.

Section 410-67(c) was introduced into the NEC to permit a transition from the hi-temp fixture wires of a recessed incandescent fixture to lo-temp branch-circuit wires. That is, a recessed incandescent fixture was provided with a 6 foot "tail" of flexible metal raceway or metal-sheathed cable containing hi-temp fixture wire for connection, within a field installed junction box, to lo-temp branch-circuit wiring. The 6 foot "tail" assured that the heat of the fixture would not be transmitted to the branch-circuit wiring.

This method provided for the fixture to be installed in a plastered or sheetrock (nonaccessible) ceiling cavity and the junction box being "placed" rather than rigidly supported and fastened. The unsupported "tail" and branch-circuit wiring assures that the box is accessible and may be retrieved (for any reason) through the fixture trim opening by removing the fixture.

A "whip" application is quite different, i.e., a "whip" is permitted to be unsupported, not more than 6 feet in length, and run from an accessible and rigidly supported and fastened outlet box for connection within an accessible ceiling to lighting fixtures or equipment.

Panel Meeting Action: Accept in Principle

Add new item (4) to 356.30 to read as follows:
(4) Securing or supporting of LFNC-B shall not be required where installed in lengths not exceeding 1.8 m (6 ft) from the last point of support for connections within an accessible ceiling to luminaire(s) [lighting fixture(s)] or other equipment.

Panel Statement:

The panel chose to add new item (4) to provide consistency with the present structure of 356.30 and with the panel action on Proposal 8-45. The phrase "an outlet" was unnecessarily restrictive. The same allowance should also apply to other equipment. The revised text meets the intent of the submitter.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 13
Ballot Not Returned: 1 Cox

8-115 Log #1204 NEC-P08 (356-42) **Final Action: Reject**

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
356.42 ~~Couplings and~~ Connectors.

Substantiation:

There are no couplings manufactured for FMC.

Panel Meeting Action: Reject

Panel Statement:

The panel recognizes that there are no listed couplings manufactured for LFNC. However, the common header "Couplings and Connectors" is a valid one used for multiple wiring articles and should remain. The panel recognizes that the submitter intended to refer to LFNC, not FMC.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 13
Ballot Not Returned: 1 Cox

8-116 Log #2334 NEC-P08 **Final Action: Accept**
(356-42)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA) / Rep. NEMA

Recommendation:

Add a new first sentence to 356.42 as shown below:
356.42 Couplings and Connectors. Only fittings listed for use with LFNC shall be used. Angle connectors shall not be used for concealed raceway installations.

Substantiation:

This proposal is for clarification. This proposal ensures that installers are not solvent cementing PVC fittings to LFNC. NEMA believes this proposal is necessary because the product is being misused by installers who solvent cement fittings onto LFNC.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-117 Log #2335 NEC-P08 **Final Action: Accept in Principle in Part**
(356-42)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA) / Rep. NEMA

Recommendation:

Add the following at the end of 356.42:
LFNC fittings listed for a wet location are permitted for direct burial or encased in concrete. Metallic fittings shall be properly protected against corrosion in accordance with 300.6(B).

Substantiation:

This proposal is for clarification. LFNC fittings that have been evaluated for a wet location are being used for direct burial applications with conduit listed for direct burial. It should be noted that, by definition, the NEC (See Article 100, Location, Wet) specifically permits products Listed for Wet Locations to be direct buried in the earth or in concrete which is in direct contact with the earth.

Panel Meeting Action: Accept in Principle in Part

The words "listed for a wet location" in the proposed first sentence and the entire proposed second sentence are rejected.
Add the following at the end of 356.42:
Straight LFNC fittings are permitted for direct burial or encasement in concrete.

Panel Statement:

The words "listed for a wet location" are rejected because all fittings must already be listed for wet location. All products listed for a wet location are not necessarily listed for direct burial.
The last sentence is not needed because the listing already requires protection against corrosion.
The word "Straight" is added to avoid confusion with the existing sentence of 356.42.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-118 Log #1900 NEC-P08 **Final Action: Reject**
(356-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
356.60 Grounding and Bonding. Where used to connect equipment where flexibility is required, an equipment ~~grounding~~ bonding conductor shall be installed.
Where required or installed, equipment ~~grounding~~ bonding conductors shall be installed in accordance with 250.134(B).
Where required or installed, equipment bonding jumpers shall be installed in accordance with 250.102.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-119 Log #1901 NEC-P08 **Final Action: Reject**
(358-2)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
358.2 Definition. Electrical Metallic Tubing (EMT). An unthreaded thinwall raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment ~~grounding~~ bonding conductor when installed utilizing appropriate fittings. EMT is generally made of steel (ferrous) with protective coatings or aluminum (nonferrous).

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-120 Log #1497 NEC-P08 **Final Action: Reject**
(358-2–Electronic Metallic Tubing (EMT))

Submitter: Ken Goerdt, Encompass Electrical Technologies-Rocky Mountains

Recommendation:

Add new text to read as follows:
358.2 Definition.
Electrical Metallic Tubing (EMT). An unthreaded thin-wall raceway of cross section designed for the physical protection and routing of conductors and cables. For use as an equipment conductor utilizing appropriate fittings only in concealed locations or ceilings where not subject to physical damage.

Substantiation:

The problem is EMT separated at the couplings in areas not subject to severe physical damage. Without an equipment grounding conductor in the conduit, there is no ground beyond the point of separation.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not provided sufficient substantiation for the change. Also, the NEC Style Manual prohibits definitions from containing requirements.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 11 Negative: 2

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: This may be excessive to require equipment grounding conductors in exposed EMT. But increases safety.
POHOLSKI: See my Explanation of Negative for Proposal 8-135.

8-121 Log #1838 NEC-P08 **Final Action: Reject**
(358-2–Securely Fastened (New))

Submitter: David Beach, PAE Consulting Engineers

Recommendation:

Add a definition to read as follows:
Securely Fastened. Attached to the building, or other underlying structure by a fastener identified for the purpose and providing a rigid mechanical connection to the building or structure.

Substantiation:

There were many proposals for the 2002 NEC which attempted to address common problems with too many EMT installations. These problems are all characterized by separation of the EMT at couplings or connectors, resulting in loss of ground continuity and physical protection of the conductors. These proposals were rejected for reasons that summarize as "If EMT is properly installed the stated problem would not exist." The continued existence of these bad installations indicates that there is not a good understanding of what a proper installation is. By defining "Securely Fastened" as including a rigid mechanical connection to the building or structure, the worst installations, on suspension wires above ceilings and on loose sleepers on roofs, will be more clearly prohibited.

Panel Meeting Action: Reject

Panel Statement:

Installation circumstances may neccessitate the use of items such as trapeeze hangers. This proposal is overly restrictive. This issue is properly addressed in 358.30(A).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-122 Log #2043 NEC-P08 **Final Action: Reject**
(358-10)

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the text in 358.10 as follows:
~~358.10 Uses Permitted.~~
~~(A) Exposed and Concealed. The use of EMT shall be permitted for both exposed and concealed work.~~
~~(B) Corrosion Protection. Ferrous or nonferrous EMT, elbows, couplings, and fittings shall be permitted to be installed in concrete, in direct contact with the earth, or in areas subject to severe corrosive influences where protected by corrosion protection and judged suitable for the condition.~~
~~(C) Wet Locations. All supports, bolts, straps, screws, and so forth shall be of corrosion resistant materials or protected against corrosion by corrosion resistant materials.~~
~~FPN:See 300.6 for protection against corrosion.~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Not Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-123 Log #2025 NEC-P08 **Final Action: Reject**
(358-12)

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Revise text in 358.12 as follows:
358.12 Uses Not Permitted. EMT shall not be used under the following conditions or in the following locations:
(1) For installations utilizing ferrous or nonferrous EMT, elbows, couplings, and fittings in concrete, in direct contact with the earth, or in areas subject to severe corrosive influences unless corrosion protection judged suitable for the condition is provided.
(2) For wet location installations unless all supports, bolts, straps, screws, and so forth are of corrosion-resistant materials or protected against corrosion by corrosion-resistant materials.
FPN: See 300.6 for protection against corrosion.
(3) For installations or uses subject to severe physical damage.
(4) For installations in corrosive locations where enamel is utilized as the sole protection.
(5) For installations in cinder concrete or cinder fill subject to permanent moisture unless protected on all sides by a layer of noncinder concrete at least 50 mm (2 in.) thick or unless the tubing is at least 450 mm (18 in.) under the fill.
(6) For any hazardous (classified) locations except as permitted by 502.4, 503.3, and 504.20.
(7) For the support of luminaries or other equipment except conduit bodies no larger than the largest trade size of the tubing.
(8) For any installation where contact with dissimilar metals produces the possibility of galvanic action.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-124 Log #895 NEC-P08 **Final Action: Reject**
(358-12(1))

Submitter: James M. Daly, General Cable

Recommendation:

Delete the word "severe" so it reads as follows:
(1) Where, during installation or afterward, it will be subject to ~~severe~~ physical damage.

Substantiation:

There is no distinction between "physical damage" and "severe physical damage" in the Code; EMT should not be subjected to any physical damage.
3.2.5.4 of the 2001 NEC Style Manual also shows "protection against physical damage" as the preferred terminology.
3.2.1 of the 2001 NEC Style Manual states that: "The NEC shall not contain references or requirements that are unenforceable or vague." The term "severe" is subjective and vague and should not be used if it can be avoided.

Panel Meeting Action: Reject

Panel Statement:

The current text reflects the panel's understanding of the proper use of EMT. The determination between physical damage and severe physical damage remains with the authority having jurisdiction.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-125 Log #590 NEC-P08 **Final Action: Accept**
(358-22)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
Number of Conductors. The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is ~~permitted~~ not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

The second paragraph of this section was added for the 2002 NEC. The substantiation for adding this provision was that... "The proposed language clarifies that cables, where permitted elsewhere in the Code, are allowed to be used in a raceway." Cable aticles are structured so that installation in raceways is not prohibited. The proposed revision will correlate the desired clarification with the cable articles, which do not specifically permit installation in raceways but instead do not prohibit installation in raceways.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-126 Log #1217 NEC-P08 **Final Action: Accept**
(358-22)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
The number of conductors shall not exceed that permitted by the percentage fill in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is not prohibited ~~permitted~~ by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

This change agrees with the panel's intent and substantiation for placing this language in the 2002 code. It was the panel's intent to allow cables in raceways unless prohibited in the respective cable article.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-127 Log #1256 NEC-P08 (358-24) **Final Action: Accept in Principle**

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

358.24 Bends — How Made. Bends shall be made so that the tubing is not damaged and the internal diameter of the tubing is not effectively reduced. The radius of the curve of any field bend to the centerline of the conduit shall not be less than shown in Table 300.18(C) ~~344.24~~ for one-shot and full shoe benders.

Substantiation:

This is a companion proposal to move Table 344.24 from Article 344 to Article 300. All raceway Articles refer to this table for the radius of conduit or tubing bends. It is appropriate that this table belongs in this general section.

Panel Meeting Action: Accept in Principle

In the submitter's recommendation, change the reference "Table 300.18(C)" to "Table 2, Chapter 9."
Also modify 358.24 in accordance with the action on Proposal 8-128.

Panel Statement:

The panel agrees that the table should appear in a more general location. Relocating the table to Chapter 9 will allow retention of the table under the purview of CMP 8.

CMP 8 recommends that the TCC review the placement (number) of the table in Chapter 9 for consistency in the overall Code organization and panel scope.

Refer to Proposal 8-24a (Log #C 800).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: See my Explanation of Negative on Proposal 8-10 (Log #1241).

8-128 Log #2938 NEC-P08 (358-24) **Final Action: Accept**

Submitter: Martin J. Brett, Jr.

Recommendation:

Revise text as follows:

358.24 Bends — How Made. Bends shall be made so that the tubing is not damaged and the internal diameter of the tubing is not effectively reduced. The radius of the curve of any field bend to the centerline of the ~~conduit~~ tubing shall not be less than shown in the Table 344.24 for one-shot and full shoe benders.

Substantiation:

For consistency within this section the reference should be to tubing not conduit. I consider this an editorial change since it does not change the intent of the code.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-129 Log #529 NEC-P08 (358-30) **Final Action: Accept**

Submitter: James M. Daly, General Cable

Recommendation:

Delete the indicated text:

EMT shall be installed as a complete system ~~as provided in Article 300~~ and shall be securely fastened in place and supported in accordance with 358.30(A) and (B).

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."
90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: See my Explanation of Negative on Proposal 8-12 (Log #524).

8-130 Log #1090 NEC-P08 **Final Action: Reject**
(358-30 (New))

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence.
All support straps, clips, hangers, and similar support hardware shall be identified for the purpose.

Substantiation:

Conduit straps, clips, hangers may not be considered "fittings".
According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-13.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-131 Log #1257 NEC-P08 **Final Action: Accept in Principle**
(358-30)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

358.30 Securing and Supporting. EMT shall be installed as a complete system as provided in Article 300 and shall be securely fastened in place and supported in accordance with 358.30(A) and (B).

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ‘‘grounded in accordance with Article 250’’ unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:
358.30 Securing and Supporting. EMT shall be installed as a complete system and shall be securely fastened in place and supported in accordance with 358.30(A) and (B).

Panel Statement:

Refer to the panel action on Proposal 8-129. The panel believes that the words "as provided in Article 300" were intended by the submitter to be deleted.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-132 Log #2282 NEC-P08 **Final Action: Reject**
(358-30(A))

Submitter: Sean Nelson, Alloway Electric

Recommendation:

Add text as follows:
In addition, each EMT run between termination points shall be securely fastened within 900 mm (3 ft) of each <u>coupling</u>, outlet box, junction box, device box, cabinet, conduit body, or other tubing termination.

Substantiation:

EMT tends to sag at couplings where the conduit is not strapped near the coupling.

Panel Meeting Action: Reject

Panel Statement:

The submitter addresses termination point and a coupling is not a termination point.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-133 Log #343 NEC-P08 **Final Action: Reject**
(358-30(B))

Submitter: Glenn W. Zieseniss Crown Point, IN

Recommendation:

Revise text to read:
(B) Horizontal runs of EMT supported by openings which horizontal opening is not larger than 3 times the nominal inside diameter of the raceway through framing members at intervals not exceeding 3 m (10 ft) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.

Substantiation:

Some openings may be more than 10 feet in width. I have seen several installations where the raceways looked like snakes between termination points in the roof trusses. The 3 times the nominal ID of the raceway of the opening in the framing members would constrain the raceway to an appearance as required by NEC 110.12 (1st sentence). Workers installing other items or equipment can easily deflect the raceway either purposely or accidentally while doing their work. Painters or persons installing advertisements may disturb the electrical raceway position. The 3 times the nominal ID would allow some minor deflections of the raceway if the framing member openings are not in a straight line.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-17.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-134 Log #591 NEC-P08 **Final Action: Accept**
(358-42)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
Couplings and Connectors. Couplings and connectors used with EMT shall be made tight. Where buried in masonry or concrete, they shall be the concretetight type. Where installed in wet locations, they shall comply with 314.15(A) ~~be the rain-tight type~~.

Substantiation:

Section 314.15(A) requires such fittings to be listed for use in wet locations. EMT is permitted for use in many types of wet locations. Some wet location applications might require greater or lesser degrees of protection from the ingress of moisture as allowed for in the first sentence of 314.15(A) "...so as to prevent moisture from entering or accumulating..." the term "Raintight-type" unnecessarily limits the applications for EMT systems within the full scope of wet location applications.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-135 Log #1496 NEC-P08 **Final Action: Reject**
(358-60)

Submitter: Ken Goerdt, Encompass Electrical Technologies-Rocky Mountains

Recommendation:

Add new text to read as follows:
Grounding EMT shall be permitted as an equipment grounding conductor only in concealed locations and ceilings where not subject to physical damage.

Substantiation:

The problem is EMT separating at couplings in areas that aren't subject to severe physical damage. I've seen it too often. If using the EMT as the EGC, you have no ground beyond the point of separation.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not provided substantiation that properly installed EMT separates at couplings.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

POHOLSKI: The use of the conduit or metallic raceway that encloses the conductors provides an excellent fault return path. When a high current fault occurs, a shower of sparks can occur from the fittings and couplings. These sparks can set fires in nearby combustible materials and this can happen even when the raceway has been installed properly with all joints pulled up to normal tightness or a little more. As installations age with time, the fittings and coupling of a raceway can corrode and even loosen from expansion and contraction and accidental contact, also service amperes are getting larger and require larger transformers that have larger fault current available. For these reasons the installation of the internal equipment-grounding conductor, in parallel with the raceway conductors, can reduce the current carried by the raceway. And, also, the all joints in conduit and raceways must be connected wrenchtight, using proper tools, for the raceway to function effectively as an equipment-grounding conductor. The grounding conductor with proper bonding in the system will reduce the difference in impedance.

8-136 Log #1902 NEC-P08 **Final Action: Reject**
(358-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
358.60 Grounding. EMT shall be permitted as an equipment ~~grounding~~ bonding conductor.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-137 Log #3527 NEC-P08 (360) **Final Action: Reject**

Submitter: Scott Wilson, Lea Electric

Recommendation:

Wording to be inserted into 360.30 to read as follows:
Securing and Supporting. FMT shall be installed as a complete system as provided in Article 360 and shall be securely fastened in place and supported in accordance with 360.30(A).
Securely Fastened. FMT shall be securely fastened at intervals not exceeding 6 ft. In addition, FMT shall be securely fastened in place within 3 ft of each outlet box, device box, junction box, cabinet, or fitting where it terminates.

Substantiation:

There have been applications where there is a hard rock ceil which is curved. It's easier and quicker to use FMT, when it's less expensive and less labor intensive to do so.

Panel Meeting Action: Reject

Panel Statement:

FMT is not permitted to be used in lengths longer than 1.8 m (6 ft) per 360.12(6). The submitter's proposal would be in contradiction of this rule.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-138 Log #282 NEC-P08 (360-10) **Final Action: Reject**

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Reject

Panel Statement:

The NEC Style Manual allows the use of single words, phrases, or sentences in lists. The present text complies with the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-139 Log #283 NEC-P08 (360-12) **Final Action: Reject**

Submitter: James M. Daly, General Cable

Recommendation:

Delete "as follows" from the end of the sentence.

Substantiation:

This change will permit each of the following list items to read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Reject

Panel Statement:

The NEC Style Manual allows the use of single words, phrases, or sentences in lists. The present text complies with the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-140 Log #2026 NEC-P08 (360-12) **Final Action: Reject**

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. The Technical Correlating Committee notes that the Task Group may need to develop a comment to delete 360.10. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Revise the text in 360.12 as follows:
360.12 Uses Not Permitted. FMT shall not be used under the following conditions or in the following locations:
(1) For installations in systems in excess of 1000 volts.
(2) For installations in hoistways.
(3) For installations in storage battery rooms.
(4) For hazardous (classified) locations unless otherwise permitted under other articles in this *Code*.
(5) For direct earth burial, or embedded in poured concrete or aggregate.
(6) For installations or uses subject to physical damage.
(7) For installations utilizing lengths over 1.8 m (6 ft).

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-141 Log #1214 NEC-P08 **Final Action: Accept**
(360-22)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
360.22 Number of Conductors.
The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is not prohibited ~~permitted~~ by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

This change agrees with the panel's intent and substantiation for placing this language in the 2002 code. It was the panel's intent to allow cables in raceways unless prohibited in the respective cable article.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-142 Log #592 NEC-P08 **Final Action: Accept**
(360-22(A))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
Number of Conductors. (A) EMT - Metric Designators 16 and 21 (Trade Sizes 1/2 and 3/4). The number of conductors in metric designators 16 (trade size 1/2) and 21 (trade size 3/4) shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is ~~permitted~~ not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

The second paragraph of this section was added for the 2002 NEC. The substantiation for adding this provision was that... "The proposed language clarifies that cables, where permitted elsewhere in the Code, are allowed to be used in a raceway." Cable articles are structured so that installation in raceways is not prohibited. The proposed revision will correlate the desired clarification with the cable articles, which do not specifically permit installation in raceways but instead do not prohibit installation in raceways.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-143 Log #1903 NEC-P08 **Final Action: Reject**
(360-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
360.60 Grounding. FMT shall be permitted as an equipment ~~grounding~~ bonding conductor where installed in accordance with 250.118(8).

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-144 Log #3028 NEC-P08 **Final Action: Reject**
(362-7 (New))

Submitter: William A. Wolfe, Steel Tube Institute of North America

Recommendation:

Add a new Section as follows:
362.7. Ampacity of Conductors. Where ENT is installed in thermal insulation, the conductor insulation rating shall be 90°C. The ampacity shall be in accordance with 310.15 but in no case shall the ampacity be de-rated less than the following:
(a) 1-3 conductors: 70% of values in Table 310.16
(b) 4-6 conductors: 50% of values in Table 310.16
(c) 7-9 conductors: 40% of values in Table 310.16

Substantiation:

We selected new Section 362.7 since it is consistent with Article 366 which includes a Section 366.7 Ampacity of Conductors.
In reviewing the changes that have occurred in the 2002 NEC for the permitted uses of ENT, we discovered that the safety issue of overheating of conductors has been overlooked for both ENT and RNC. Test data submitted by a major producer as substantiation for a 1999 Code proposal needs to be examined for its safety impact.
There is often thermal insulation inside walls and in concealed spaces of floor/ceiling assemblies. According to a 1996 UL Fact-Finding Report (File E73317, Project 96NK29786) for Lamson & Sessions/Carlon, when ENT is installed wrapped in thermal insulation both the conductors inside and the ENT reach temperatures in excess of insulation rated at 90 degrees C when the Ampacity is that specified by the NEC. UL had planned to use a test current of 80% of that number. They discovered that the ampacity had to be lowered to the following percentages of the NEC ampacity in order to not exceed a temperature of 90oC: Trade Size 1/2: 70%; Trade Sizes 3/4 - 2: 50%. Rigid Nonmetallic was the same except for Trade Size 2 which had to be lowered to 40%. The UL Report compares results of unwrapped vs. wrapped ENT when the same tests currents are applied: there was as much as a 95% increase in raceway temperature and a 71% increase in the temperature of the conductor insulation in the wrapped samples.
We realize that installation in thermal insulation can differ according to many factors, and the response may not be as great as when RNC is wrapped in insulation. However, some of the tests came within 8 - 10 points of reaching the 60oC wire insulation limit with no wrap and with the substantially reduced ampacity. The NEC should specify these de-rating factors much as it has long required 90oC insulation for NM cable.
The requirement to use 90oC conductors is based on the fact that even with the substantial de-rating, all the conductors exceeded a temperature of 60oC in the thermal wrap test.
There is no doubt that without the suggested de-rating, temperatures will substantially deform the conduit and place more stress at support points as the temperatures sometimes can exceed the temperature in which nonmetallic conduit is permitted to be installed for similar reasons. This is of particular concern due to the possibility that recent changes may lead to more installation in metal stud construction. This information supplements 310.10 FPN (3) and aids enforcement.
The UL Fact Finding Report was referenced in Proposal 3-141 that the producer submitted for the 1999 NEC to allow the use of ENT in "other spaces used for environmental air" where wrapped in insulation (failed). The proposal included the de-rating factors shown above and the substantiation stated:
"The UL Fact Finding Report also describes the excessive conductor insulation temperatures that were recorded when the circuits were operated at the ampacities permitted by Note 8, Notes to Ampacity Tables of 0 to 2000 Volts. The proposal specifies the adjustment factors necessary to keep the conductor insulation temperature at acceptable levels, based on ampacities cited in the UL Fact Finding Report."
The Summary in the UL Fact Finding Report States that: The electrical heat tests performed on the ENT and RNMC wiring systems wrapped with insulation required an adjustment factor to reduce the current values necessary to bring the temperatures on the conductors below the 90oC insulation rating (See Table 3)." Table 3 lists the de-rating factors shown in our proposal above.
Note: Supporting Material is available for review at NFPA Headquarters

Panel Meeting Action: Reject

Panel Statement:

The UL fact finding report defined a particular test for the addition of RNC and ENT for use in an environmental air-handling space. The testing in this fact finding report does not represent an actual installation or materials used with RNC and ENT when used with insulation within a structure. The submitter failed to provide the panel with technical documentation showing actual failures or safety-related problems in the field.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-145 Log #2429 NEC-P08 **Final Action: Reject**
(362-10(2) and 362.10(5))

TCC Action:

See Technical Correlating Committee Note on Proposals 8-148 and 8-150.

Submitter: Larry Neibauer, Automatic Fire Alarm Association

Recommendation:

Delete the Exceptions in Section 362.10(2) and 362.10(5).

Substantiation:

The Exceptions violate paragraph 4.2 of the 2001 NEC Style Manual of Style by including a direct reference to NFPA 13-1999 in an Exception, which is mandatory code language.

"4.2 References to Other Standards. References to other standards shall not be in mandatory Code text. References to product standards shall be in an informative annex. References to other Standards shall be in the Fine Print Notes."

Panel Meeting Action: Reject

Panel Statement:

The panel's intent was to accept the current text with mandatory references, not a FPN, which is not mandatory.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-146 Log #2553 NEC-P08 **Final Action: Reject**
(362-10(2) and 362.10(5) Exceptions)

TCC Action:

See Technical Correlating Committee Note on Proposals 8-148 and 8-150.

Submitter: Sanford Egesdal, Egesdal Associates PLC

Recommendation:

Delete the Exceptions in Section 362.10(2) and 362.10(5).

Substantiation:

The Exceptions violate paragraph 4.2 of the 2001 NEC Style Manual by including a direct reference to NFPA 13-1999 in an Exception, which is mandatory code language.

"**4.2 References to Other Standards.** References to other standards shall not be in mandatory Code text. References to product standards shall be in an informative annex. References to other Standards shall be in the Fine Print Notes."

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-145.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-147 Log #284 NEC-P08 **Final Action: Accept**
(362-10(2) Exception)

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
"…ENT ~~is~~ shall be permitted to be used…".

Substantiation:

Editorial revision in accordance with 3.1.1 of the NEC Style Manual.

Panel Meeting Action: Accept

Panel Statement:

The panel recognizes that the substantiation refers to 3.1.2, "Permissive Rules", of the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-148 Log #1258 NEC-P08 **Final Action: Reject**
(362-10(2) Exception)

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal and accomplish their intended objective without a direct reference to the standard. The Standards Council decision during the 2002 NEC processing was related to the fact that the Technical Correlating Committee changed the reference after the comment stage had been completed. The panel has ample time and opportunity during this cycle to arrive at an acceptable solution and be in compliance with the NEC Style Manual. This action will be considered by the panel as a public comment.

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

(2) In any building exceeding three floors above grade, ENT shall be concealed within walls, floors, and ceilings where the walls, floors, and ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies. The 15-minute-finish-rated thermal barrier shall be permitted to be used for combustible or noncombustible walls, floors, and ceilings.

Exception: ENT shall be permitted to be used within walls, floors, and ceilings, exposed or concealed, in buildings exceeding three floors above grade ~~W~~where the building is protected throughout by a fire sprinkler system~~(s) is~~ installed in accordance with the applicable building code~~ NFPA 13-1999, Standard for the Installation of Sprinkler Systems, on all floors, ENT is permitted to be used within walls, floors, and ceilings, exposed or concealed, in buildings exceeding three floors above grade~~.

FPN No. 1: For further information, see NFPA-13, Standard for the Installation of Sprinkler Systems or the local building code.

FPN No. 2: A finish rating is established for assemblies containing combustible (wood) supports. The finish rating is defined as the time at which the wood stud or wood joist reaches an average temperature rise of 121°C (250°F) or an individual temperature of 163°C (325°F) as measured on the plane of the wood nearest the fire. A finish rating is not intended to represent a rating for a membrane ceiling.

Substantiation:

The reference to NFPA 13 is not in accordance with the NEC Style Manual.

Panel Meeting Action: Reject

Panel Statement:

This proposal was addressed in the previous cycle and was brought before the NFPA Standards Council (SC#01-64(t) July 13 2001) and was upheld. No new substantiation is provided.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

KENDALL: This proposal should be Accepted. The reference is not in accordance with the NEC Style Manual. Another option would be for the Technical Correlating Committee to revise the NEC Style Manual to permit references to other standards in an Exception. This would allow adoption of the NEC and not necessarily the adoption of other standards. If the other standards, such as NFPA-13, is not adopted, then the Exception cannot be used.

8-149 Log #285 NEC-P08 **Final Action: Accept**
(362-10(5) Exception)

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
"…ENT~~is~~ shall be permitted to be used…".

Substantiation:

Editorial revision in accordance with 3.1.1 of the NEC Style Manual.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-150 Log #1259 NEC-P08 **Final Action: Reject**
(362-10(5) Exception)

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal and accomplish their intended objective without a direct reference to the standard. The Standards Council decision during the 2002 NEC processing was related to the fact that the Technical Correlating Committee changed the reference after the comment stage had been completed. The panel has ample time and opportunity during this cycle to arrive at an acceptable solution and be in compliance with the NEC Style Manual. This action will be considered by the panel as a public comment.

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

(5) Above suspended ceilings where the suspended ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies, except as permitted in 362.10(1)(a).

Exception: ENT shall be permitted to be used above suspended ceilings in buildings exceeding three floors above grade ~~W~~where the building is protected throughout by a fire sprinkler system(s) is installed in accordance with the applicable building code ~~NFPA 13–1999, Standard for the Installation of Sprinkler Systems, on all floors, ENT is permitted to be used above suspended ceilings within walls, floors, and ceilings, exposed or concealed, in buildings exceeding three floors above grade~~.

FPN: For further information, see NFPA-13, Standard for the Installation of Sprinkler Systems or the local building code.

Substantiation:

The reference to NFPA 13 is not in accordance with the NEC Style Manual.

Panel Meeting Action: Reject

Panel Statement:

This proposal was addressed in the previous cycle and was brought before the NFPA Standards Council (SC#01-64(t) July 13 2001) and was upheld. No new substantiation is provided.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

KENDALL: This proposal should be Accepted. The reference is not in accordance with the NEC Style Manual. Another option would be for the Technical Correlating Committee to revise the NEC Style Manual to permit references to other standards in an Exception. This would allow adoption of the NEC and not necessarily the adoption of other standards. If the other standard, such as NFPA-13, is not adopted then the Exception cannot be used.

8-152 Log #286 NEC-P08 **Final Action: Reject**
(362-12)

Submitter: James M. Daly, General Cable

Recommendation:

Revise 362.12 as follows:
362.12 Uses Not Permitted. ENT shall not be used ~~in the following:~~

Substantiation:

Editorial revision to make the ten listed items read as complete sentences in accordance with 2.1.5.1 of the NEC Style Manual.

Panel Meeting Action: Reject

Panel Statement:

The NEC Style Manual allows the use of single words, phrases, or sentences in lists. The present text complies with the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-151 Log #12 NEC-P08 **Final Action: Accept in Principle in Part**
(362-12 and Exception)

NOTE: The following proposal consists of Comment 8-30 on Proposal 8-57 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 8-57 was:
Revise Article 331 to read as follows:

[Text of (May 2001) Proposal 8-57 is shown on page 2321]

Submitter: James M. Daly, BICC General

Recommendation:

The proposal should continue to be accepted in principle with the following revisions.
331-12 Revise as follows:
ENT shall not be used ~~in the following:~~
Add the following exception to 331-12(4):
Exception: Insulated conductors or multiconductor cables rated at a higher temperature than the ENT listed temperature rating shall be permitted to be installed in ENT provided they are not operated at a temperature higher than the ENT listed temperature rating.

Substantiation:

Deletion of the phrase "in the following" makes the list read better as complete sentences.
The exception will resolve a conflict within the code.
There are numerous wire and cable products in the code that are rated higher than the ENT temperature rating.
The exception will permit higher rated conductors or cables to be installed in ENT provided they are not operated at a temperature higher than the ENT temperature rating.
The temperature rating of the ENT will not be exceeded, equivalent safety will be provided, and other products will not be prohibited from being used in ENT.

Panel Meeting Action: Accept in Principle in Part

Revise 362.12(4) to read as follows:

(4) For conductors or cables whose insulation temperature limitations would exceed those for which the tubing is listed.
Exception: Conductors or cables rated at a temperature higher than the ENT listed temperature rating shall be permitted to be installed in ENT provided they are not operated at a temperature higher than the ENT listed temperature rating.

Panel Statement:

In order to follow the NEC Manual of Style, the panel does not agree with deleting the phrase "in the following" .
The panel removed the word "multiconductor" because the word "cable" includes multiconductor cable. The revised text meets the intent of the submitter.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 13
Ballot Not Returned: 1 Cox

8-153 Log #287 NEC-P08 **Final Action: Accept in Part**
(362-12(4))

Submitter: James M. Daly, General Cable

Recommendation:

Revise 362.12(4) as follows:
(4) For conductors or multiconductor cables whose insulation temperature limitations would exceed those for which the tubing is listed
Exception: Conductors or multiconductor cables rated at a temperature higher than the ENT listed temperature rating shall be permitted to be installed in ENT provided they are not operated at a temperature higher than the ENT listed temperature rating.

Substantiation:

There are numerous conductors and multiconductor cables that are rated at a higher temperature than the ENT listed temperature rating. The exception will permit higher rated conductors or cables to be installed in ENT provided they are not operated at a temperature higher than the ENT listed temperature rating. The temperature rating of the ENT will not be exceeded, equivalent safety will be provided, and other products will not be prohibited from being installed in ENT.

Panel Meeting Action: Accept in Part

The panel rejects the addition of the word "multiconductor."

Panel Statement:

The panel removed the word "multiconductor" because the word "cable" includes multiconductor cable. The revised text meets the intent of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: The added Exception should have been underlined. The conductors in a raceway should not have a temperature rating higher then the raceway. They could be operated accidentally at their temperature rating.

8-154 Log #530 NEC-P08 **Final Action: Accept**
(362-12(8))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(8) In theaters and similar locations, except as provided in 518.4 and 520.5 ~~Articles 518 and 520~~.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified. References to parts within articles shall be permitted."

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-155 Log #593 NEC-P08 **Final Action: Accept**
(362-22)

TCC Action:

The Technical Correlating Committee directs that this proposal be referred to Code-Making Panel 7 for information.

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
Number of Conductors. The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.
Cables shall be permitted to be installed where such use is ~~permitted~~ not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

The second paragraph of this section was added for the 2002 NEC. The substantiation for adding this provision was that... "The proposed language clarifies that cables, where permitted elsewhere in the Code, are allowed to be used in a raceway." Cable articles are structured so that installation in raceways is not prohibited. The proposed revision will correlate the desired clarification with the cable articles, which do not specifically permit installation in raceways but instead do not prohibit installation in raceways.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-156 Log #1216 NEC-P08 **Final Action: Accept**
(362-22)

TCC Action:

The Technical Correlating Committee directs that this proposal be referred to Code-Making Panel 7 for information.

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
The number of conductors shall not exceed that permitted by the percentage fill in Table 1, Chapter 9. Cables shall be permitted to be installed where such use is not prohibited ~~permitted~~ by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

Substantiation:

This change agrees with the panel's intent and substantiation for placing this language in the 2002 code. It was the panel's intent to allow cables in raceways unless prohibited in the respective cable article.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-157 Log #1260 NEC-P08 (362-24) **Final Action: Accept in Principle**

TCC Action:

The Technical Correlating Committee advises that assignment of Tables in Chapter 9 is the responsibility of the Technical Correlating Committee and the Technical Correlating Committee "Accepts" the Panel Action.

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

362.24 Bends — How Made. Bends shall be made so that the tubing will not be damaged and that the internal diameter of the tubing will not be effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment, and the radius of the curve to the centerline of such bends shall not be less than shown in Table 300.18 ~~344.24~~ using the column "Other Bends."

Substantiation:

This is a companion proposal to move Table 344.24 from Article 344 to Article 300. All raceway Articles refer to this table for the radius of conduit or tubing bends. It is appropriate that this table belongs in this general section.

Panel Meeting Action: Accept in Principle

In the submitter's recommendation, change the reference "Table 300.18(C)" to "Table 2, Chapter 9."

Panel Statement:

The panel agrees that the table should appear in a more general location. Relocating the table to Chapter 9 will allow retention of the table under the purview of CMP 8.

CMP 8 recommends that the TCC review the placement (number) of the table in Chapter 9 for consistency in the overall Code organization and panel scope.

Refer to Proposal 8-24a (Log #CP800).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: See my Explanation of Negative on Proposal 8-10 (Log #1241).

8-158 Log #531 NEC-P08 (362-30) **Final Action: Accept**

Submitter: James M. Daly, General Cable

Recommendation:

Delete the indicated text:

ENT shall be installed as a complete system ~~as provided in Article 300~~ and shall be securely fastened in place and supported in accordance with 362.30(A) and (B).

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified." 90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

LOYD: See my Explanation of Negative on Proposal 8-12 (Log #524).

8-159 Log #1091 NEC-P08 **Final Action: Reject**
(362-30 (New))

Submitter: Russell LeBlanc, Peterson School of Engineering

Recommendation:

Add one last sentence.
All support straps, clips, hangers, and similar support hardware shall be identified for the purpose.

Substantiation:

Conduit straps, clips, hangers may not be considered "fittings".
According to the UL White Book they are listed as "hardware" not "fittings". The respective code article requires listed fittings, but does not mention hardware. This new wording will make it clear that proper conduit straps, clips, hangers, etc. shall be used.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-13.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-160 Log #1261 NEC-P08 **Final Action: Accept**
(362-30)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

362.30 Securing and Supporting. ENT shall be installed as a complete system ~~as provided in Article 300~~ and shall be securely fastened in place and supported in accordance with 362.30(A) and (B).

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ‘‘grounded in accordance with Article 250’’ unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-161 Log #13 NEC-P08 **Final Action: Reject**
(362-30 Exception)

NOTE: The following proposal consists of Comment 8-32 on Proposal 8-57 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. [See Proposal 8- (Log #12)]

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Accept in principle revised as follow:
Delete present exception and substitute:
Exception No. 1: The intervals for fastening and support from luminaires and equipment in or on suspended ceilings shall be permitted to be increased where: (1) structural members (including support wires or rods and ceiling grid members) where permitted to be used, do not readily permit support intervals required by this section; (2) the nearest readily available support member is used; (3) the fastening and support intervals do not exceed 1.8 m (6 ft); and (4) the ENT is above the suspended ceiling.
Exception No. 2: Fastening shall not be required where an unbroken length of ENT is fished between access points in finished buildings or structures.

Substantiation:

I believe the original concept of allowing unsupported lengths was to apply to the space above suspended ceilings. Present wording permits a carte blanche use for all installations and negates the general rule. Where structural support above a suspended ceiling is less than 6 ft above the ceiling or where support wires or ceiling grids not prohibited from support are available at less than 6 ft there is no reason such members can't be used. Similar exceptions for other wiring methods include connection to equipment and permit fishing.

Panel Meeting Action: Reject

Panel Statement:

The current text is clear. The strapping requirements should apply to equipment in an accessible ceiling.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-162 Log #14 NEC-P08 **Final Action: Accept in Principle**
(362-30(A) Exception)

NOTE: The following proposal consists of Comment 8-33 on Proposal 8-57 in the 2001 May Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2002 NATIONAL ELECTRICAL CODE. [See Proposal 8- (Log #12)]

Submitter: Joseph A. Ross, Ross Seminars

Recommendation:

Revise the Exception as follows:
Exception: Lengths not exceeding 6-feet (1.83m) from an outlet for connection within an accessible ceiling to lighting fixtures or equipment.

Substantiation:

This revised exception is not to be considered new material. Note: The proper text presently appears in Sections 333-7(b)(3), 334-10(b), and 336-18 Exception No. 2. This Comment corrects an omission. It is to be noted that ENT is intended to be permitted as a "whip." The text of the present Exception stops short of referencing Section 410-67(c), but uses the text from Section 410-67(c) and ENT is not permitted for that use (to contain hi-temp conductors). See companion Comments for Sections 350-30 and 3XX-30(a) Exception.

The omission must be corrected as 6-foot lengths (whips) are presently manufactured and listed and in common use today. Some inspectors have rejected their use.

The term "whip" is not defined in the NEC, but everyone knows what a "whip" is and takes for granted that flexible raceways and cables are permitted for this use. However, many misinterpret that Section 410-67(c) addresses "whips" and believe the method is covered. It is not.

Section 410-67(c) was introduced into the NEC to permit a transition from the hi-temp fixture wires of a recessed incandescent fixture to lo-temp branch-circuit wires. That is, a recessed incandescent fixture was provided with a 6 foot "tail" of flexible metal raceway or metal-sheathed cable containing hi-temp fixture wire for connection, within a field installed junction box, to lo-temp branch-circuit wiring. The 6 foot "tail" assured that the heat of the fixture would not be transmitted to the branch-circuit wiring.

This method provided for the fixture to be installed in a plastered or sheetrock (nonaccessible) ceiling cavity and the junction box being "placed" rather than rigidly supported and fastened. The unsupported "tail" and branch-circuit wiring assures that the box is accessible and may be retrieved (for any reason) through the fixture trim opening by removing the fixture.

A "whip" application is quite different, i.e., a "whip" is permitted to be unsupported, not more than 6 feet in length, and run from an accessible and rigidly supported and fastened outlet box for connection within an accessible ceiling to lighting fixtures or equipment.

Panel Meeting Action: Accept in Principle

Renumber the existing exception as Exception No. 1

Add a new exception to read as follows:

Exception No. 2: Lengths not exceeding 1.8 m (6 ft) from the last point of support for connections within an accessible ceiling to luminaire(s) [lighting fixture(s)] or other equipment.

Panel Statement:

The existing exception is retained to address taps.

The phrase "an outlet" was unnecessarily restrictive. The same allowance should also apply to other equipment. The revised text meets the intent of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-163 Log #342 NEC-P08 **Final Action: Reject**
(362-30(B))

Submitter: Glenn W. Zieseniss Crown Point, IN

Recommendation:

Revise text to read:

(B) Horizontal runs of ENT supported by openings which horizontal opening is not larger than 6 times the nominal inside diameter of the raceway through framing members at intervals not exceeding 900 mm (3 ft) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.

Substantiation:

Some openings may be more than 10 feet in width. I have seen several installations where the raceways looked like snakes between termination points in the roof trusses. The 6 times the nominal ID of the raceway of the opening in the framing members would constrain the raceway to an appearance as required by NEC 110.12 (1st sentence). Workers installing other items or equipment can easily deflect the raceway either purposely or accidentally while doing their work. Painters or persons installing advertisements may disturb the electrical raceway position. The 6 times the nominal ID would allow some minor deflections of the raceway if the framing member openings are not in a straight line.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-17.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-164 Log #532 NEC-P08 **Final Action: Accept**
(362-60)

Submitter: James M. Daly, General Cable

Recommendation:

Delete the text indicated:
Where equipment grounding is required ~~by Article 250~~, a separate equipment grounding conductor shall be installed in the raceway.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified." 90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-165 Log #1262 NEC-P08 **Final Action: Accept**
(362-60)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

362.60 Grounding. Where equipment grounding is required ~~by Article 250~~, a separate equipment grounding conductor shall be installed in the raceway.

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ‘‘grounded in accordance with Article 250’’ unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-166 Log #1904 NEC-P08 **Final Action: Reject**
(362-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
362.60 Grounding. Where equipment grounding is required by Article 250, a separate equipment ~~grounding~~ bonding conductor shall be installed in the raceway.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-167 Log #1263 NEC-P08 (362-100) **Final Action: Reject**

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

362.100 Construction. ENT shall be made of ~~material that does not exceed the ignitibility, flammability, smoke generation, and toxicity characteristics of~~ rigid (nonplasticized) polyvinyl chloride.

ENT, as a prewired manufactured assembly, shall be provided in continuous lengths capable of being shipped in a coil, reel, or carton without damage.

Substantiation:

The Bi-National Standard for Electrical Nonmetallic Tubing, UL1653, Section 4.1 requires ENT to be made from Rigid (nonplasticized) Polyvinyl Chloride (PVC). In addition, there is not a ENT on the market made from another material.

Panel Meeting Action: Reject

Panel Statement:

The text proposed for removal would result in requirements that are overly restrictive and could preclude the future use of other materials.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-168 Log #1207 NEC-P08 (366) **Final Action: Accept in Principle**

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise texts as follows:
Rewrite "Article 366 Auxiliary Gutters" to consistent style.

[Text of Proposal 8-168 recommendation is shown on page 2324]

Substantiation:

The last cycle Code-Making Panel 7 and Code-Making Panel 8 rewrote many of the articles in Chapter 3. This will make Article 366 style consistent. There are not changes intended by this rewrite.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the panel action on Proposal Log CP802. The revised text meets the intent of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

WAGNER: Proposal Log CP802 incorporates many of the submitter's concerns. However, this proposal does not incorporate his proposal that all Nonmetallic Auxiliary gutters be listed and that Metal Auxiliary gutters be listed or fabricated in accordance with 366.100. An Authority Having Jurisdiction does not have the means available to determine the safety of the design and manufacture of these products. Therefore, Auxiliary gutters and their associated fittings, as a wiring method, should be evaluated and listed by an independent third party certification organization.

Concerns that these products require flexibility in their design and manufacture in order to accommodate variations encountered in the field can be mitigated by the listing of a range of designs and sizes and the use of field investigations performed by the certification organization.

8-167a Log #CP802 NEC-P08 **Final Action: Accept**
(Article 366)

Submitter: Code-Making Panel 8

Recommendation:

Revise Article 366 to read as follows:

[Text of Proposal 8-167a recommendation is shown on page 2323]

Substantiation:

The panel accepts in principle the submitter's intent on Proposal 8-168 to reorganize the auxiliary gutters article to parallel the other raceway articles for usability.

The panel action on Proposals 8-169, 8-170, 8-171, and 8-172 have been incorporated into the recommendation.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-169 Log #1264 NEC-P08 (366-10) **Final Action: Accept in Principle**

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

366.10 Construction and Installation. Auxiliary gutters shall comply with 366.10(A) through (E) ~~(F)~~.

(A) Electrical and Mechanical Continuity. Gutters shall be constructed and installed so that adequate electrical and mechanical continuity of the complete system is secured.

(B) Substantial Construction. Gutters shall be of substantial construction and shall provide a complete enclosure for the contained conductors. All surfaces, both interior and exterior, shall be suitably protected from corrosion. Corner joints shall be made tight, and where the assembly is held together by rivets, bolts, or screws, such fasteners shall be spaced not more than 300 mm (12 in.) apart.

(C) Smooth Rounded Edges. Suitable bushings, shields, or fittings having smooth, rounded edges shall be provided where conductors pass between gutters, through partitions, around bends, between gutters and cabinets or junction boxes, and at other locations where necessary to prevent abrasion of the insulation of the conductors.

(D) Deflected Insulated Conductors. Where insulated conductors are deflected within an auxiliary gutter, either at the ends or where conduits, fittings, or other raceways or cables enter or leave the gutter, or where the direction of the gutter is deflected greater than 30 degrees, dimensions corresponding to 312.6 shall apply. Also, conductors are required to be shaped or formed in a permanent manner so that they are not in contact with bare busbars within the gutter.

(E) Indoor and Outdoor Use.

(1) Sheet Metal Auxiliary Gutters. Sheet metal auxiliary gutters installed in wet locations shall be suitable for such locations.

(2) Nonmetallic Auxiliary Gutters.

(a) Nonmetallic auxiliary gutters installed outdoors shall comply with the following:

(1) Be listed and marked as suitable for exposure to sunlight

(2) Be listed and marked as suitable for use in wet locations

(3) Be listed for the maximum ambient temperature of the installation, and marked for the installed conductor insulation temperature rating

(4) Have expansion fittings installed where the expected length change due to expansion and contraction due to temperature change is more than 6 mm (0.25 in.)

(b) Nonmetallic auxiliary gutters installed indoors shall comply with the following:

(1) Be listed for the maximum ambient temperature of the installation and marked for the installed conductor insulation temperature rating

(2) Have expansion fittings installed where expected length change, due to expansion and contraction due to temperature change, is more than 6 mm (0.25 in.)

FPN:Extreme cold may cause nonmetallic auxiliary gutter to become brittle and therefore more susceptible to damage from physical contact.

This section provides requirements for both indoor and outdoor installations. Nonmetallic gutters must have expansion fittings where temperature changes are expected to change gutter length more than 1/4 in. See the fine print note following 378.44 regarding expansion characteristic of PVC rigid nonmetallic conduit and PVC nonmetallic wireway.

~~(F) Grounding. Grounding shall be in accordance with the provisions of Article 250.~~

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.

4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.

4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ''grounded in accordance with Article 250'' unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the panel action on Proposal 8-167a (Log #CP802). Reference to Article 250 was removed per the NEC Style Manual, Section 4.1. The language grounding metal auxiliary gutters is appropriate.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-170 Log #1466 NEC-P08 (366-10) **Final Action: Accept in Principle**

Submitter: Jamie McNamara Hastings, MN

Recommendation:

I underlined added text I put a strike through deleted text.
366.10 Construction and Installation.
Auxiliary gutters shall comply with 366.10(A) through (~~F~~G).
"…"
(D) Deflected Insulated Conductors. Where insulated conductors are deflected within an auxiliary gutter, either at the ends or where conduits, fittings, or other raceways or cables enter or leave the gutter, or where the direction of the gutter is deflected greater than 30 degrees, dimensions corresponding to 312.6 shall apply.
(E) Auxiliary Gutters Used as Pullboxes. Where insulated conductors 4 AWG or larger are pulled through an auxiliary gutters, the distance between raceway and cable entries enclosing the same conductor shall not be less than that required in 314.28(A)(1) for straight pulls and 314.28(A)(2) for angle pulls.
(~~E~~F) Indoor and Outdoor Use……
(~~F~~G) Grounding. Grounding shall be in accordance with the provisions of Article 250.

Substantiation:

To keep people from tying to circumvent the requirements for a pullbox. By using an auxiliary gutter as a pullbox and not meeting the minimum size requirements for a pullbox. As long as these gutters that are used for pullboxs are used within 30' of distribution equipment the current text could be mistaken to permit them without adequate sizing.

Panel Meeting Action: Accept in Principle

Insert the proposed additional item as 366.58(B) in the panel action of Proposal Log CP802.

Panel Statement:

Refer to the panel action on Proposal 8-167a (Log #CP802).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-171 Log #2856 NEC-P08 (366-10(D)) **Final Action: Accept in Principle**

Submitter: Jim Pauley, Square D Company

Recommendation:

Revise 366.10(D) as shown below:

(D) Deflected Insulated Conductors. Where insulated conductors are deflected within an auxiliary gutter, either at the ends or where conduits, fittings, or other raceways or cables enter or leave the gutter, or where the direction of the gutter is deflected greater than 30 degrees, dimensions corresponding to one wire per terminal in Table 312.6 shall apply.

Substantiation:

The present language leads to inconsistent sizing of auxiliary gutters. Because of the general reference to 312.6(A), users of the code are applying the wiring space requirements for parallel conductors by using the multiple wires per terminal columns in Table 312.6(A). The inconsistency comes about because if I have the exactly the same number of conductors routed in exactly the same manner but not installed as parallel conductors, I can use the one conductor per terminal column in Table 312.6(A).

For example, take 3-300kcmil conductors installed in parallel. Table 312.6(A) would say that I need an auxiliary gutter 10 inches in width if the auxiliary gutter is deflected more than 30 degrees. If I install 3 separate 300kcmil conductors (not paralleled) in the same arrangement, I only need five inches.

Considering that the auxiliary gutter has to still be large enough to accommodate the number of conductors in accordance with 366.6, it makes little sense to have a "per terminal" sizing for conductor deflection.

This proposal would clear up the issue by stating that you use the one wire per terminal column when determining the gutter width for deflections greater than 30 degrees of the auxiliary gutter.

The wires per terminal columns make sense when you are doing the terminal bending space requirements, but not for conductor deflection.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the panel action on Proposal 8-167a (Log#CP 802). The proposed revision has been made in 366.58(A) in the recommendation of Proposal 8-167a (Log#CP802). The panel corrected the table reference to Table 312.6(A).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-172 Log #533 NEC-P08 (366-10(F)) **Final Action: Accept in Principle**

Submitter: James M. Daly, General Cable

Recommendation:

Delete 336.10(F).

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified." 90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to panel action on Proposal 8-167a (Log #CP802). Reference to Article 250 was removed per the NEC Style Manual, Section 4.1. The language "grounding metal auxiliary gutters" is appropriate.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-173 Log #1208 NEC-P08 (368) **Final Action: Accept in Principle**

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
Rewrite "Article 368 Busways" to consistent style.

[Text of Proposal 8-173 recommendation is shown on page 2328]

Substantiation:

The last cycle Code-Making Panel 7 and Code-Making Panel 8 rewrote many of the articles in Chapter 3. This will make Article 368 style consistent. There are not changes intended by this rewrite.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the recommendation of Proposal Log CP803. The revised text meets the intent of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-172a Log #CP803 NEC-P08 (Article 368) **Final Action: Accept**

Submitter: Code-Making Panel 8

Recommendation:

Revise Article 368 to read as follows:

[Text of Proposal 8-172a recommendation is shown on page 2326]

Substantiation:

The panel accepts in principle the submitter's intent in Proposal 8-173 to reorganize the busway article to parallel the other raceway articles for usability. The panel accepts many of the submitter's renumbered article and headings, but does not accept inclusion of the 600 V and over requirements to be integrated with the 600 V and less requirements.
The panel action on Proposals 8-182, 8-185, 8-186, and 8-187 have been incorporated into the recommendation.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-174 Log #1444 NEC-P08 (368-2) **Final Action: Reject**

Submitter: David Wilhelm, Busway Inc.

Recommendation:

Revise the definition to read:
A grounded metal enclosure or non-metallic enclosure containing a ground, that contains~~ing~~ factory mounted, bare or insulated conductors, which are usually copper or aluminum bars, rods, or tubes.

Substantiation:

The standard as written today does not allow for non-metallic busway. There is a solution for busway with greater inherent safety characteristics than exists with the metal enclosed busway used in the United States today. Epoxy encapsulated busway prevents the need for heaters that are used in outdoor busway today due to condensation inside the busway, incorrect installation, periodic maintenance issues and potential maintenance problems associated with metal enclosed busway. Epoxy encapsulated busway is submersible, corrosion resistant, has no chimney effect, is explosion proof and has passed flammability tests according to IEC 60439-1 and 60439-2 and is maintenance free. The encapsulated busway can be used and is used n Europe in corrosive and explosive atmospheres. This product has been tested to IEC 60439-1 and 60439-2 and is tested to more stringent standards for busway than the metal enclosed busway standard UL857 that is used in the United States. I have enclosed a document that summarizes the UL857 standard and IEC 60439-2 standard and how the testing that this product has been through compares to the metal enclosed busways that are used in the United States today. The encapsulated busway is rated to IP68.7, which is comparable to a NEMA 6P enclosure rating which gives the busway a submersible rating.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

Substantiation for a scope expansion of the busway article to include a non-metallic housing extends beyond a simple comparison of the UL 857 and IEC 60439 product standards. Other installation and construction considerations must be considered before adding non-metallic enclosures to the scope of the busway article in NEC such as over 600 V installations, NEC 300.22, and hazardous locations.
An independent third-party fact finding report including the above issues would be appropriate.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-175 Log #2184 NEC-P08 (368-2–Busway) **Final Action: Reject**

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
368.2 Definition.
Busway. An ~~grounded~~ earthed metal enclosure containing factory mounted, bare or insulated conductors, which are usually copper or aluminum bars, rods, or tubes.
FPN: For cablebus, refer to Article 370.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated its desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The proposed change does not improve the consistency or usability of the Code. The term affected by the proposal is more in the purview of CMP-5.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-176 Log #155 NEC-P08 **Final Action: Reject**
(368-3 (New))

Submitter: W. Creighton Schwan Hayward, CA

Recommendation:

Add new text to read as follows:
368.3 Listing Requirements. Busways and their associated fittings shall be listed.

Substantiation:

There are features of busways for which the Authority Having Jurisdiction does not have the means for determining the safety of the design and manufacture, including: voltage and current ratings; heat rise; continuity of fault path on enclosure; support spacings, and indoor or outdoor suitability.

Panel Meeting Action: Reject

Panel Statement:

It is not the intent of the panel to require the listing of busways, as the submitter has not provided sufficient substantiation to require such a requirement for busway.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 10 Negative: 3

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: I support the concept of third party listing. The listing of busways and associated fitting would ensure that they are safe for their intended use.

ROWE: I disagree with the panel action of rejecting this proposal.

Code-Making Panel 8 has been extremely proactive in requiring materials within our purview to be evaluated and listed for use. To require less of busway and associated busway fittings is, in my mind, a regrettable retreat from that position, and, is not technically defensible.

Bus installed within busway carries electrical current throughout both habitable and nonhabitable occupancies, of single, multi-story and high-rise structures, providing electrical energy to equipment and devices in a manner similar to conductors and cables, (which are universally required to be listed).

Conduit, tubing and raceway, (functioning in a manner similar to that of the busway enclosure by isolating, protecting and, in the case of metallic busway enclosures, affording a bonded path for fault current), within which cables and conductors are commonly installed has almost universally been required to be listed by action of this Code-Making Panel.

Previously, with regard to issues which our panel members professed to have personal knowledge we very often accept and create panel proposals based on our knowledge and experience without one bit of additional substantiation. To reject this proposal and defend the rejection by alleging that the submitter has not provided sufficient technical substantiation flies in the face of our previous action and does a disservice to the code-making process.

I don't feel that from a strictly technical perspective, marketing and economic issues aside, there should be disagreement on a requirement for listing this product.

WAGNER: The submitter is correct in his substantiation that the Authority Having Jurisdiction does not have the means available to determine the safety of their design and manufacture. Therefore, Busways and their associated fittings, as a wiring method, should be evaluated and listed by an independent third party certification organization.

Concerns that these products require flexibility in their design and manufacture in order to accommodate variations encountered in the field can be mitigated by the listing of a range of designs and sizes and the use of field investigations performed by the certification organization.

8-177 Log #1445 NEC-P08 **Final Action: Reject**
(368-4(A)(2))

Submitter: David Wilhelm, Busway Inc.

Recommendation:

Revise text to read as follows:
"and installed so that the joints between sections and at fittings are accessible for maintenance purposes unless busway joints are totally encapsulated and maintenance is not required."

Substantiation:

After installation the joints are totally encapsulated and no air can contact any part of the busbars or their connections, so maintenance of the joints is never required.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

The submitter has not presented sufficient substantiation that would support a change in the requirement for joint maintenance of the mechanical connection of the busway joint.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-178 Log #896 NEC-P08 **Final Action: Reject**
(368-4(B)(1))

Submitter: James M. Daly, General Cable

Recommendation:

Delete the word "severe" so it reads as follows:
(1) Where subject to ~~severe~~ physical damage or corrosive vapors.

Substantiation:

There is no distinction between "physical damage" and "severe physical damage" in the Code; busways should not be subjected to any physical damage.
3.2.5.4 of the 2001 NEC Style Manual also shows "protection against physical damage" as the preferred terminology.
3.2.1 of the 2001 NEC Style Manual states that: "The NEC shall not contain references or requirements that are unenforceable or vague." The term "severe" is subjective and vague and should not be used if it can be avoided.

Panel Meeting Action: Reject

Panel Statement:

The current text reflects the panel's understanding of the proper use of busway. The determination between physical damage and severe physical damage remains with the authority having jurisdiction.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-179 Log #1446 NEC-P08 **Final Action: Reject**
(368-4(B)(1))

Submitter: David Wilhelm, Busway Inc.

Recommendation:

Revise text to read as follows:
Where subject to severe physical damage or corrosive vapors, unless specifically approved for such use.

Substantiation:

The standard as written does not allow for use of products such as the epoxy encapsulated busway which has been tested by Ciba Specialty Chemicals Inc. Switzerland ref. No. 10.1/K402.3.30 for different types of corrosive atmospheres.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

The submitter's substantiation demonstrates that, after 48 hours of evaluation, over 25% of the chemical agents attacked the busway. The substantiation does not provide the necessary documentation for the panel to demonstrate that a busway system will not be attacked by the corrosive agent over the life of the installation.
Refer to the data supplied by the submitter with Proposal 8-174.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: The panel should reconsider this proposal and change underlined text to read "unless specifically listed for the purpose."

8-180 Log #1447 NEC-P08 **Final Action: Reject**
(368-6(C) (New))

Submitter: David Wilhelm, Busway Inc.

Recommendation:

Add new text to read as follows:
(C) Underground. Busway may be used underground if specifically tested for such use and must comply with the applicable requirements of 300.5.

Substantiation:

The standard as written does not allow for use of products such as the epoxy encapsulated busway, which has been tested to IEC 60439-2 and is submersible and capable of being buried. I assume that column 3 of Table 300.5 NEC 2002 would be the column that could be followed since the product described above is a non-metallic raceway (busway).
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-174.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-181 Log #1905 NEC-P08 **Final Action: Reject**
(368-8)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
368.8 Branches from Busways. Branches from busways shall be permitted to be made in accordance with 368.8(A), (B), and (C).
(A) General. Branches from busways shall be made in accordance with Articles 320, 330, 332, 342, 344, 348, 350, 352, 356, 358, 362, 368, 384, 386, and 388. Where a separate equipment ~~grounding~~ bonding conductor is used, connection of the equipment ~~grounding~~ bonding conductor to the busway shall comply with 250.8 and 250.12.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-182 Log #534 NEC-P08 **Final Action: Accept in Principle**
(368-8(A))

TCC Action:

The Technical Correlating Committee understands that the recommended changes in this Proposal have been incorporated as 368.56 in Proposal 8-172a.

Submitter: James M. Daly, General Cable

Recommendation:

Revise as follows:
(A) General. Branches from busways shall be ~~made in accordance with Articles 320, 330, 332, 342, 344, 348, 350, 352, 356, 358, 362, 268, 384, 386, and 388~~ permitted to use any of the following wiring methods:
(1) Type AC Armored Cable
(2) Type MC Metal-Clad Cable
(3) Type MI Mineral-insualted, Metal-Sheathed Cable
(4) Type IMC Intermediate Metal Conduit
(5) Type RMC Rigid Metal Conduit
(6) Type FMC Flexible Metal Conduit
(7) Type LFMC Liquidtight Flexible Metal Conduit
(8) Type RNC Rigid Nonmetallic Conduit
(9) Type LFNC Liquidtight Flexible Nonmetal Conduit
(10 Type EMT Electrical Metallic Tubing
(11) Type ENT Electrical Nonmetallic Tubing
(12) Busways
(13) Strut-Type Channel Raceway
(14) Surface Metal Raceways
(15) Surface Nonmetallic Raceways
Where a separate equipment grounding conductor is used, connection of the equipment grounding conductor to the busway shall comply with 250.8 and 250.12.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."
3.3.2 of the NEC Style Manual states that "If possible, use lists or tables to present requirements, rather than long text descriptions."

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the recommendation of Proposal 8-172a (Log#CP803).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-183 Log #3458 NEC-P08 **Final Action: Reject**
(368-8(B) Exception)

Submitter: Charles M. Trout, Maron Electric Co. Inc.

Recommendation:

Delete this exception in its entirety.

Substantiation:

The National Electrical Code is prescriptive code. To say "where the conditions of maintenance and supervision ensure that only qualified persons service the installation," is a performance requirement. Without prescriptive requirements indicating whether this qualified person is an employee of the owner of the premises or is a separately contracted person and the Authority Having Jurisdiction has a means of verification of the continued employment of the qualified person and whether the qualified person has been verified by the authority having jurisdiction as meeting the definition of a qualified person as shown in the definitions of this Code no prescriptive requirements have been followed.

To permit relaxation of the safety requirements of this Code without establishing a positive guarantee that the safety of persons and property is indisputably assured is a reprehensible act.

Panel Meeting Action: Reject

Panel Statement:

The substantiation does not demonstrate a need to delete this exception when appropriately applied. This exception does not relax the NEC safety requirements, as additional restrictions of conditions of maintenance and supervision are ensuring that only qualified persons service the installation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

POHOLSKI: (This is used as a loophole for Industrial Establishments)

There should be more controls on the qualified persons as to their training and knowledge of the system for the safe maintenance of it.

Add: Documentation of their qualifications and safety training of the system must be on file with the local authority having jurisdiction.

This would help ensure the safe maintenance of the system by only a qualified person.

8-184 Log #1061 NEC-P08 **Final Action: Reject**
(368-8(C))

Submitter: Barry D. Besmanoff, Litelab Corporation

Recommendation:

To provide for legitimate use of such devices we request that 368.8(C) be reworded as follows:

Branches from Trolley-Type and Continuous Plug-In Busways. Suitable cord and cable assemblies approved for extra-hard usage or hard usage and listed bus drop cable shall be permitted as branches from trolley-type and continuous plug-in busways for the connection of moveable equipment in accordance with 400.7 and 400.8.

Substantiation:

There are now products available, carrying Listings as Continuous Plug-In Busways under UL 857, being sold to provide highly portable power in large spaces. The busway may also find use as both decorative and structural elements of the space. Generally, these have been in "big-box" retail establishments, where the busway will be mounted well below the structural ceiling, and, in some cases, may be incorporated as part of a grid supporting a t-bar ceiling. In many of these situations, there is no structural element of the building (wall, column or ceiling) within a reasonable distance.

368.8(B)(1) requires the drop cord to be attached to the building. 368.8(B)(2) requires the cord to be attached to an approved tension take-up device with 6 ft (1.8 m), and according to the illustration in the NEC Handbook, this tension take-up device shall be connected to the building structure. In many of these buildings, it is almost impossible to meet the code requirements due to the distance to any nearby structural element, and the need to maintain portability.

Panel Meeting Action: Reject

Panel Statement:

Continuous plug-in busway requires the busway plug-in unit to be fixed in place for use and therefore requires the same wiring methods as plug-in busway. Continuous plug-in busway is not a trolley-type busway that is used to serve moving equipment such as hoists on monorails and tag-line applications where travel distance is required, and making an attachment to the building defeats the purpose of the trolley-type busway needed for this application.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-185 Log #535 NEC-P08 **Final Action: Accept**
(368-13)

TCC Action:

The Technical Correlating Committee understands that the recommended changes in this Proposal are reflected in 368.17(D) in Proposal 8-172a.

Submitter: James M. Daly, General Cable

Recommendation:

Delete the last sentence in 368.13 that reads:
Where so used, the circuit shall comply with the applicable requirements of Articles 210, 430, and 440.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified." 90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-186 Log #536 NEC-P08 **Final Action: Accept**
(368-22)

TCC Action:

The Technical Correlating Committee understands that the recommended changes in this Proposal are reflected in 368.60 in Proposal 8-172a.

Submitter: James M. Daly, General Cable

Recommendation:

Delete text as follows:
Metal-enclosed bus shall be grounded ~~in accordance with Article 250~~.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified." 90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-187 Log #1265 NEC-P08 **Final Action: Accept**
(368-22)

TCC Action:

The Technical Correlating Committee understands that the recommended changes in this Proposal are reflected in 368.60 in Proposal 8-172a.

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:
368.22 Grounding. Metal-enclosed bus shall be grounded ~~in accordance with Article 250~~.

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ‘‘grounded in accordance with Article 250’’ unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-188 Log #1448 NEC-P08 (368-22) **Final Action: Reject**

Submitter: David Wilhelm, Busway Inc.

Recommendation:

Revise text to read as follows:
Metal enclosed bus and non-metallic enclosed bus shall be grounded in accordance with Article 250.

Substantiation:

The standard as written does not allow for use of products such as the epoxy encapsulated busway which has been tested to IEC 60439-2 and is capable of being used at voltages over 600V.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-174.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-189 Log #1449 NEC-P08 (368-23) **Final Action: Reject**

Submitter: David Wilhelm, Busway Inc.

Recommendation:

Revise text to read as follows:
Metal enclosed busways and non-metallic busways shall be installed so that temperature rise from induced circulating currents in any adjacent metallic parts will not be hazardous to personnel or constitute a fire hazard.

Substantiation:

The standard as written does not allow for use of products such as the epoxy encapsulated busway which has been tested to IEC 60439-2 and is capable of being used at voltages over 600V.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-174.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-190 Log #1450 NEC-P08 (368-25) **Final Action: Reject**

Submitter: David Wilhelm, Busway Inc.

Recommendation:

Revise text to read as follows:
Bus runs that have sections located both inside and outside of buildings shall have a vapor seal at the building wall to prevent interchange of air between indoor and outdoor sections if busway is not totally encapsulated.

Substantiation:

The standard as written does not allow for use of products such as the epoxy encapsulated busway which has been tested to IEC 60439-2 and does not have the possibility of air inside the busway, therefore, the interchange of air from inside and outside is not possible and no condensation can occur.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-174.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-191 Log #1451 NEC-P08 **Final Action: Reject**
(368-26)

Submitter: David Wilhelm, Busway Inc.

Recommendation:

Revise text to read as follows:
Drain plugs, filter drains, or similar methods shall be provided to remove condensed moisture from low points in bus run unless busway is totally encapsulated.

Substantiation:

The standard as written does not allow for use of products such as the epoxy encapsulated busway which has been tested to IEC 60439-2 and does not have the possibility of condensation inside the busway. The encapsulated busway does not need heaters for outdoor installations because condensation is not possible; therefore this busway is much safer for outdoor use than metal enclosed busway.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-174.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-192 Log #537 NEC-P08 **Final Action: Accept**
(370-3)

Submitter: James M. Daly, General Cable

Recommendation:

Revise the second paragraph of 370.3 as follows:
Cablebus framework, where bonded ~~as required by Article 250~~, shall be permitted to be used as the equipment grounding conductor for branch circuits and feeders.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."
90.3 states that Chapters 1, 2, 3 and 4 apply generally.
Addition of the phrase "to be used" improves clarity.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-193 Log #1266 NEC-P08 **Final Action: Accept**
(370-3)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

370.3 Use. Approved cablebus shall be permitted at any voltage or current for which spaced conductors are rated and shall be installed for exposed work only, except as permitted in 370.6. Cablebus installed outdoors or in corrosive, wet, or damp locations shall be identified for such use. Cablebus shall not be installed in hoistways or hazardous (classified) locations unless specifically approved for such use. Cablebus shall be permitted to be used for branch circuits, feeders, and services.

Cablebus framework, where bonded ~~as required by Article 250~~, shall be permitted as the equipment grounding conductor for branch circuits and feeders.

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ‘‘grounded in accordance with Article 250’’ unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-194 Log #1906 NEC-P08 **Final Action: Reject**
(370-3)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
370.3 Use. Approved cablebus shall be permitted at any voltage or current for which spaced conductors are rated and shall be installed for exposed work only, except as permitted in 370.6. Cablebus installed outdoors or in corrosive, wet, or damp locations shall be identified for such use. Cablebus shall not be installed in hoistways or hazardous (classified) locations unless specifically approved for such use. Cablebus shall be permitted to be used for branch circuits, feeders, and services.
Cablebus framework, where bonded as required by Article 250, shall be permitted as the equipment ~~grounding~~ bonding conductor for branch circuits and feeders.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-195 Log #538 NEC-P08 **Final Action: Accept**
(370-4(A))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(A) Types of Conductors. The current-carrying conductors in cablebus shall have an insulation rating of 75°C (167°F) or higher ~~of~~ and be an approved type ~~and~~ suitable for the application i~~n accordance with Articles 310 and 490~~.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified." 90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-196 Log #732 NEC-P08 **Final Action: Reject**
(370-4(A)(d))

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise text of (A): The insulated ~~current carrying~~ conductors..." (remainder unchanged).
Revise text of (D): The~~ insulated~~ circuit conductors shall be supported on insulating blocks or other insulating means..." (remainder unchanged).

Substantiation:

The phrase "current-carrying" may be interpreted as not including neutrals as covered in 310.15(B). The requirement of (D) should apply to bare service grounded conductors (neutrals) which if not insulated from supports may be in parallel with the framework.

Panel Meeting Action: Reject

Panel Statement:

NEC 310.15(B) addresses adjustment factors for thermal performance and does not specifically address which conductors may or may not be current carrying. NEC 370.4(A) addresses conductor insulation, and (D) addresses the supporting means of the conductors. The application will dictate the appropriate configuration of the assembly, making the proposed revision to (D) also unnecessary.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-197 Log #897 NEC-P08 **Final Action: Reject**
(370-7(4))

Submitter: James M. Daly, General Cable

Recommendation:

Delete the word "severe" so it reads as follows:
(4) Additional physical protection where required, such as guards ~~where subject~~ to ~~severe~~ prevent physical damage.

Substantiation:

There is no distinction between "physical damage" and "severe physical damage" in the Code; cablebus should not be subjected to any physical damage.
3.2.5.4 of the 2001 NEC Style Manual also shows "protection against physical damage" as the preferred terminology.
3.2.1 of the 2001 NEC Style Manual states that: "The NEC shall not contain references or requirements that are unenforceable or vague." The term "severe" is subjective and vague and should not be used if it can be avoided.

Panel Meeting Action: Reject

Panel Statement:

The current text reflects the panel's understanding of the proper use of cablebus. The determination between physical damage and severe physical damage remains with the authority having jurisdiction.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-198 Log #1267 NEC-P08 **Final Action: Reject**
(370-9)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

370.9 Grounding. A cablebus installation shall be grounded and bonded. ~~in accordance with Article 250, excluding~~ 250.86, Exception No. 2 does not apply to cablebus.

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ‘‘grounded in accordance with Article 250’’ unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Reject

Panel Statement:

The present wording referring to Article 250 with the exclusion of 250.86 Exception No. 2 does not violate the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

Sequence Numbers 8-199 and 8-200 were not used.

9-73a Log #1839 NEC-P09 **Final Action: Accept**
(370-20)

Submitter: David Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation:

Change 370.20 to 314.20.

Substantiation:

I haven't seen an erratus to this effect, but the reference should have changed with renumbering.

Panel Meeting Action: Accept

Panel Statement:

The panel acknowledges the reference occurs in Section 406.4(A) and has been changed through errata and is correct in the second edition of the NEC.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: This is an erratum. It should not be recorded as a change in the 2005 NEC by a marginal line.

9-73b Log #316 NEC-P09 **Final Action: Reject**
(370-23(G)(2) Exception No. 1 (New))

Submitter: Lou Preston, Preston Lighting

Recommendation:

Currently the article reads:
"A fixture supported by a single conduit shall not exceed 12 in. (305 mm) in any horizontal direction from the point of conduit entry."
I would like to propose that an exception be made for a light weight fixture that exceeds 12 in:
Exception No. 1: A fixture that weighs less than 25 lbs may extend up to 30 in. in a horizontal direction from the point of conduit entry.

Substantiation:

There are energy efficient 2 ft x 4 ft fixtures available that replace a traditionally round HID. The 2 x 4s are lighter than the HIDs and the weight distribution is symmetrical around the pendant. This is the only code that restricts changing the high wattage HID pendant mount, with an energy efficient 2 x 4 fixture. Replacing a round heavy HID with a light weight 2 x 4 provides a safe means of mounting the fixture to a single conduit.

Panel Meeting Action: Reject

Panel Statement:

The submitter did not provide adequate technical substantiation to permit the extra distance and moment-arm as described in the Proposal.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

HARTWELL: For ROP users, this proposal addresses the final sentence of 314.23(H)(2), second paragraph.

8-201 Log #539 NEC-P08 **Final Action: Accept**
(372-3)

Submitter: James M. Daly, General Cable

Recommendation:

Delete 372.3.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."
90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-203 Log #1268 NEC-P08 **Final Action: Accept**
(372-3)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Delete the following text:

~~372.3 Other Articles. Cellular concrete floor raceways shall comply with the applicable provisions of Article 300.~~

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ‘‘grounded in accordance with Article 250’’ unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-202 Log #950 NEC-P08 **Final Action: Accept in Principle**
(372-3 or 372.11)

Submitter: Roger D. Wilson, The Austin Company

Recommendation:

The following sentence could be added to section 372.3 (or 372.11):
"The ampacity adjustment factors, in Article 310, shall also apply to conductors installed in cellular concrete floor raceways".

Substantiation:

Relatively few electrical design engineers, electrical inspectors, plan-checkers, and electricians realize (or agree) that the ampacity adjustment factors, of Article 310, also must be applied to conductors in cellular concrete floor raceways. This has resulted in many installations where such raceways are filled to 40 percent with no derating. The general belief seems to be that such derating would defeat much of the advantage of using this type of raceway. The NEC should clearly state this requirement in the text of Article 372.

Panel Meeting Action: Accept in Principle

Add the following as a new 372.17:
"372.17 Ampacity of Conductors. The ampacity adjustment factors, in 310.15(B)(2), shall apply to conductors installed in cellular concrete floor raceways".

Panel Statement:

The revised text and location more properly place the intended requirement into the Code.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-204 Log #951 NEC-P08 **Final Action: Accept in Principle**
(374-5)

Submitter: Roger D. Wilson, The Austin Company

Recommendation:

The following sentence should be added to Section 374.5:
"The ampacity adjustment factors, in Article 310, shall also apply to cellular metal floor raceways".

Substantiation:

Relatively few electrical design engineers, electrical inspectors, plan-checkers, and electricians realize (or agree) that the ampacity adjustment factors, of Article 310, also must be applied to conductors in cellular metal floor raceways. This has resulted in many installations where such raceways are filled to 40 percent, with no derating. The general belief seems to be that such derating would defeat much of the advantage of using this type of raceway. The NEC should clearly state this requirement in the text of Article 374.

Panel Meeting Action: Accept in Principle

Add the following as a new 374.17 to Part I Installation:
"374.17 Ampacity of Conductors. The ampacity adjustment factors, in 310.15(B)(2), shall apply to conductors installed in cellular metal floor raceways".
Renumber 374.12 as 374.100.

Panel Statement:

The revised text and location more properly place the intended requirement into the Code.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-205 Log #1907 NEC-P08 **Final Action: Reject**
(374-11)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
374.11 Connection to Cabinets and Extensions from Cells. Connections between raceways and distribution centers and wall outlets shall be made by means of flexible metal conduit where not installed in concrete, rigid metal conduit, intermediate metal conduit, electrical metallic tubing, or approved fittings. Where there are provisions for the termination of an equipment ~~grounding~~ bonding conductor, nonmetallic conduit, electrical nonmetallic tubing, or liquidtight flexible nonmetallic conduit where not installed in concrete shall be permitted.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-206 Log #2703 NEC-P08 **Final Action: Accept in Principle**
(374-11)

Submitter: George Straniero, AFC Cable Systems

Recommendation:

Revise to include liquidtight flexible nonmetallic conduit that is suitable for installation in concrete as follows:
374.11 Connection to Cabinets and Extensions from Cells.
Connections between raceways and distribution centers and wall outlets shall be made by means of flexible metal conduit where not installed in concrete, rigid metal conduit, intermediate metal conduit, electrical metallic tubing, or approved fittings. Where there are provisions for the termination of an equipment grounding conductor, nonmetallic conduit, electrical nonmetallic tubing, or liquidtight flexible nonmetallic conduit ~~where not installed in concrete~~ shall be permitted. Where installed in concrete, liquidtight flexible nonmetallic conduit shall be marked "Direct Burial."
FPN: Liquidtight flexible nonmetallic conduit that is suitable for installation in concrete is marked for "Direct Burial."

Substantiation:

Liquidtight flexible nonmetallic conduit should be added as an approved wiring method in concrete because it is UL listed as suitable for use in poured concrete when marked as "Direct Burial."

Panel Meeting Action: Accept in Principle

Revise 374.11 to read as follows:
374.11 Connection to Cabinets and Extensions from Cells.
Connections between raceways and distribution centers and wall outlets shall be made by means of liquidtight flexible metal conduit, flexible metal conduit where not installed in concrete, rigid metal conduit, intermediate metal conduit, electrical metallic tubing, or approved fittings. Where there are provisions for the termination of an equipment grounding conductor, nonmetallic conduit, electrical nonmetallic tubing, or liquidtight flexible nonmetallic conduit shall be permitted. Where installed in concrete, liquidtight flexible nonmetallic conduit shall be listed and marked for direct burial.
FPN: Liquidtight flexible metal conduit and liquidtight flexible nonmetallic conduit that is suitable for installation in concrete is listed and marked for direct burial.

Panel Statement:

The proposal was revised to include the language proposed within proposals 8-206 and 8-207.
The revised text meets the intent of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-207 Log #2704 NEC-P08 **Final Action: Accept in Principle**
(374-11)

Submitter: George Straniero, AFC Cable Systems

Recommendation:

Revise to include liquidtight flexible metal conduit that is suitable for installation in concrete as follows:
374.11 Connection to Cabinets and Extensions from Cells.
Connections between raceways and distribution centers and wall outlets shall be made by means of liquidtight flexible metal conduit, flexible metal conduit where not installed in concrete, rigid metal conduit, intermediate metal conduit, electrical metallic tubing, or approved fittings. Where there are provisions for the terminations of an equipment grounding conductor, nonmetallic conduit, electrical nonmetallic tubing, or liquidtight flexible nonmetallic conduit where not installed in concrete shall be permitted.
FPN: Liquidtight flexible metal conduit that is suitable for installation in concrete is marked for "Direct Burial."

Substantiation:

Liquidtight flexible metal conduit should be added as an approved wiring method because it is equal to the currently permitted flexible metal conduit and is UL listed as suitable for use in poured concrete when marked as "Direct Burial."

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the panel action and statement on Proposal 8-206.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-208 Log #154 NEC-P08 **Final Action: Reject**
(376-6 (New))

Submitter: W. Creighton Schwan Hayward, CA

Recommendation:

Add new text to read as follows:
376.6 Listing Requirements. Metal wireways and associated fittings shall be listed.

Substantiation:

There are features of metal wireways for which the Authority Having Jurisdiction does not have the means for determining the safety of the design and manufacture. The main one of these is the ability of the wireway to carry large fault currents between joints. Listing will provide the Authority Having Jurisdiction with the assurance that the product will perform as expected when carrying power conductors.

Panel Meeting Action: Reject

Panel Statement:

The submitter's recommendation is overly restrictive, and the substantiation is insufficient to require the listing of wireway and associated fittings. The use of wireway as an equipment grounding conductor is addressed in 250.118(14).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 11 Negative: 2

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: I support the concept of third party listing. The listing of wireways and associated fitting would ensure that they are safe for their intended use.
WAGNER: The submitter is correct in his substantiation that the Authority Having Jurisdiction does not have the means available to determine the safety of their design and manufacture. Therefore, Wireways and their associated fittings, as a wiring method, should be evaluated and listed by an independent third party certification organization.
Concerns that these products require flexibility in their design and manufacture in order to accommodate variations encountered in the field can be mitigated by the listing of a range of designs and sizes and the use of field investigations performed by the certification organization.

8-209 Log #2044 NEC-P08 (376-10) **Final Action: Reject**

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the entire text in Section 376.10 as follows:

~~376.10 Uses Permitted.~~

~~The use of metal wireways shall be permitted in the following:~~

~~(1) For exposed work~~

~~(2) In concealed spaces as permitted in 376.10(4)~~

~~(3) In hazardous (classified) locations as permitted by 501.4(B) for Class I, Division 2 locations; 502.4(B) for Class II, Division 2 locations; and 504.20 for intrinsically safe wiring. Where installed in wet locations, wireways shall be listed for the purpose.~~

~~(4) As extensions to pass transversely through walls if the length passing through the wall is unbroken. Access to the conductors shall be maintained on both sides of the wall.~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Not Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-210 Log #2027 NEC-P08 **Final Action: Reject**
(376-12)

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Add text to read as follows:
376.12 Uses Not Permitted. Metal wireways shall not be used in the following:
(1) Where subject to severe physical damage
(2) Where subject to severe corrosive environments
(3) In concealed spaces, except as an extension to pass transversely through walls if the length passing through the wall is unbroken and access to the conductors is maintained on both sides of the wall.
(4) In hazardous (classified) locations except as permitted by 501.4(B) for Class I, Division 2 locations; 502.4(B) for Class II, Division 2 locations; and 504.20 for intrinsically safe wiring.
(5) Where installed in wet locations, except where listed for that purpose.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-211 Log #898 NEC-P08 **Final Action: Reject**
(376-12(1))

Submitter: James M. Daly, General Cable

Recommendation:

Delete the word "severe" so it reads as follows:
(1) Where subject to ~~severe~~ physical damage.

Substantiation:

There is no distinction between "physical damage" and "severe physical damage" in the Code; metal wireways should not be subjected to any physical damage.
3.2.5.4 of the 2001 NEC Style Manual also shows "protection against physical damage" as the preferred terminology.
3.2.1 of the 2001 NEC Style Manual states that: "The NEC shall not contain references or requirements that are unenforceable or vague." The term "severe" is subjective and vague and should not be used if it can be avoided.

Panel Meeting Action: Reject

Panel Statement:

The current text reflects the panel's understanding of the proper use of metal wireway. The determination between physical damage and severe physical damage remains with the authority having jurisdiction.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-212 Log #942 NEC-P08 **Final Action: Reject**
(376-12(2))

Submitter: James M. Daly, General Cable

Recommendation:

Delete the word "severe" so it reads as follows:
(2) Where subject to ~~severe~~ corrosive environments.

Substantiation:

There is no distinction between "corrosive environments" and "severe corrosive environments" in the Code; metal wireways should not be subjected to any corrosive environments.
3.2.1 of the 2001 NEC Style Manual states that "The NEC shall not contain references or requirements that are unenforceable or vague." The term "severe" is subjective and vague and should not be used if it can be avoided.

Panel Meeting Action: Reject

Panel Statement:

The submitter's substantiation is incorrect. Examples of severe corrosive environments are given in 300.6(C) FPN.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-213 Log #238 NEC-P08 **Final Action: Accept in Principle**
(376-23(A))

Submitter: Russell Banks Grand Blanc, MI

Recommendation:

At the end of the last sentence of 376.23(A) add the words: <u>based on one conductor per terminal</u> so the paragraph reads as follows:
(A) Deflected Insulated Conductors. Where insulated conductors are deflected within a metallic wireway, either at the ends or where conduits, fittings, or other raceways or cables enter or leave the metallic wireway, or where the direction of the metallic wireway is deflected greater than 30 degrees, dimensions corresponding to 312.6(A) shall apply <u>based on one conductor per terminal</u>.

Substantiation:

It is not clear when using Table 312.6(A) which column to use when determining the width of a wireway. The rule needs to state clearly which column in Table 312.6(A) is to be used.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the panel action on Proposal 8-214.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-214 Log #2857 NEC-P08 **Final Action: Accept**
(376-23(A))

Submitter: Jim Pauley, Square D Company

Recommendation:

Revise 373.23(A) as shown below:
(A) Deflected Insulated Conductors. Where insulated conductors are deflected within a metallic wireway, either at the ends or where conduits, fittings, or other raceways or cables enter or leave the metallic wireway, or where the direction of the metallic wireway is deflected greater than 30 degrees, dimensions corresponding to one wire per terminal in Table 312.6(A) shall apply.

Substantiation:

The present language leads to inconsistent sizing of wireways. Because of the general reference to 312.6(A), users of the code are applying the wiring space requirements for parallel conductors by using the multiple wires per terminal columns in Table 312.6(A). The inconsistency comes about because if I have the exactly the same number of conductors routed in exactly the same manner but not installed as parallel conductors, I can use the one conductor per terminal column in Table 312.6(A).

For example, take 3-300kcmil conductors installed in parallel. Table 312.6(A) would say that I need a wireway 10 inches in width if the wireway is deflected more than 30 degrees. If I install 3 separate 300kcmil conductors (not paralleled) in the same arrangement, I only need five inches.

Considering that the wireway has to still be large enough to accommodate the number of conductors in accordance with 376.22, it makes little sense to have a "per terminal" sizing for conductor deflection.

This proposal would clear up the issue by stating that you use the one wire per terminal column when determining the gutter width for deflections greater than 30 degrees of the wireway.

The wires per terminal columns make sense when you are doing the terminal bending space requirements, but not for conductor deflection.

Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13
Ballot Not Returned: 1 Cox

8-215 Log #1082 NEC-P08 **Final Action: Reject**
(376-23(B))

Submitter: George H. Little, Little Enterprises

Recommendation:

Raceway or cable entries on opposite sides of the wireway that are offset less than 152 mm (6 in.) are considered straight pulls.

Substantiation:

There seems to be an unnecessary amount of confusion as to when we have a straight pull or when we are deflecting the conductors 30 degrees. By using the approach of measuring with a ruler I feel that the tradesmen and all others will be able to understand this section better. If we have entries that are offset less than 152 mm (6 in.) then 314.28(A)(1) would ask for a dimension of 8 times the metric designator (trade size) of the largest raceway.

Panel Meeting Action: Reject
Panel Statement:

There is no technical substantiation to demonstrate a need to make a change to the present wording.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 13
Ballot Not Returned: 1 Cox

8-216 Log #3057 NEC-P08 **Final Action: Accept in Part**
(376-23(B))

Submitter: Truman C. Surbrook, Michigan State University

Recommendation:

Modify the paragraph as indicated and add a new sentence that deals with providing an equivalent metric designator for cable entries.

(B) Nonmetallic Wireways Used as Pullboxes. Where insulated conductors 4 AWG or larger are pulled through a wireway, the distance between raceway and cable entries enclosing the same conductor shall not be less than ~~that required in 314.28(A)(1) for straight pulls and 314.28(A)(2) for angle pulls~~ eight times the metric designator (trade size) of the largest raceway. When transposing cable size into raceway size, the minimum metric designator (trade size) raceway required for the number and size of conductors in the cable shall be used.

Substantiation:

Section 362.6 of the 1999 NEC was easy to understand. Apparently in the case of a straight pull it was discovered this rule was not consistent with 370-28(A)(1) for straight pulls. It is inappropriate to reference 314.28(A)(1) and 314.28(A)(2) in the case of wireway. The question in the field for electricians and inspectors is when is it a straight pull and when is it an angle pull for a wireway application, and when is it simply conductors running down the wireway. There is too much room for judgment with little information in the rule upon which to make a judgment. Angle pulls should not even be considered for wireway runs except in the rare case where a conductor enters the end of a run and then leaves the wireway at a right angle near the end.

This rule can easily be simplified by using the language of the 1999 NEC but changing the rule to eight times rather than six times the trade diameter of the largest raceway or cable. If a straight pull is involved, then this will force the width of the wireway to be eight times the metric designator of the largest raceway. If the distance between conductor entries is eight times or greater the largest raceway diameter, then the rule of 376.23(A) will apply. Since for most applications the conductors enter and leave the wireway at some point, presently it is a judgment as to when 314.28(A)(1), 314.28(A)(2), or 376.23(A) will apply.

If this rule is to be applied to cable, then there needs to be an explanation as to what metric designator is to be used for a particular cable size as is the case in 314.28(A).

Panel Meeting Action: Accept in Part

The revision to the first sentence of 376.23(B) is not accepted.

The proposed new second sentence is accepted.

Panel Statement:

The panel understands that the submitter meant to make this proposal for metallic wireways, not nonmetallic wireways.

The rejected proposed language would not permit an angle pull to be considered differently from a straight pull.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-217 Log #2859 NEC-P08 (376-56) **Final Action: Reject**

TCC Action:

It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting. This action will be considered by the panel as a public comment.

Submitter: Jim Pauley, Square D Company

Recommendation:

Revise 376.56 as shown below:

376.56 Splices, ~~and~~ Taps, and Power Distribution Blocks.

(A) Splices and Taps. Splices and taps shall be permitted within a wireway provided they are accessible. The conductors, including splices, and taps, shall not fill the wireway to more than 75 percent of its area at that point.

(B) Power Distribution Blocks

(1) Installation. Power distribution blocks installed in metal wireways shall be listed.

(2) Size of Enclosure. In addition to the wiring space requirement in 376.56(A), the power distribution block shall be installed in a wireway with dimensions not smaller than that specified in the installation instructions of the power distribution block.

(3) Wire Bending Space. Wire bending space at the terminals of power distribution blocks shall comply with 312.6(B).

Substantiation:

This proposal is intended to add language to the wireway article to recognize the installation of power distribution blocks within the wireway. It is clear from the UL listing information on Power Distribution Blocks (QPQS) that these blocks are intended for installation in wireways. However, there is no recognition of them in the wireway articles.

The proposal is to make the existing language regarding splices and taps as part (A). Part (B) then applies to the power distribution blocks. Keep in mind that the key difference between (A) and (B) is that the power distribution blocks are mounted to the enclosure and they typically have exposed live parts (i.e. the terminals are mounted on insulated bases that may not have a cover).

Item (1) would require that the block be a listed item. This is important to avoid "homemade" blocks that are not properly insulated or supported.

Item (2) makes it clear that the 75% wiring space limitation for splices and taps must be applied to the distribution block, but in addition the listing specifies minimum enclosure dimensions and those must be followed as well.

Item (3) brings in the rules for wire bending space since these units are typically "set screw" style terminals. This would require that the terminal bending space comply with 312.6(B).

For reference, the UL guide card information is shown below:

"This category covers power distribution blocks rated 600 volts or less and intended to be used on the load side of service equipment in accordance with the National Electrical Code, NFPA 70. These blocks are used for splicing and tapping conductors in metallic wireways, auxiliary gutters, junction boxes, termination boxes and the like in order to distribute power to separate circuits or loads.

A power distribution block consists of a connector(s) mounted on an insulating base. Each individual connector has provisions for connection of one or more conductors and multiple smaller tap-off conductors.

Power distribution blocks are considered suitable for use on circuits having available fault current not greater than 10,000 RMS symmetrical amps, unless marked with a larger value.

Installation instructions are provided for proper mounting and use. These instructions include minimum enclosure dimensions.

The power distribution block is marked with the letters "AL" to indicate use with aluminum conductors only;"CU" : to indicate for use with copper conductors only; or "CU" and "AL" to indicate for use with either type of conductor.

The power distribution block is marked with:

a) a "7" or "9" in conjunction with the "AL" or "AL-CU" marking. This marking corresponds with the marking on the individual connector, i.e. AL7CU, AL9, etc.

b) a torque associated with each conductor tightening means.

c) an amp rating that signifies the maximum current per pole and

d) a voltage rating.

The basic requirements used to investigate products in this category are contained in Subject 1953, "Outline of Investigation For Power Distribution Blocks" .

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory), together with the word "LISTED" , a control number, and the following product name: "Power Distribution Block" ."

Panel Meeting Action: Reject

Panel Statement:

The submitter's substantiation indicates that the power distribution block is mounted in the enclosure and will typically have exposed

live parts. This type of arrangement is not appropriate for installation in wireways.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 11 Negative: 2

Ballot Not Returned: 1 Cox

Explanation of Negative:

BURNS: Code-Making Panel 8 should not have rejected Proposal 8-217. In many areas, authorities having jurisdiction are not allowing "Power Distribution Blocks", when installed in wireways. These type of devices are listed and provide a much safer installation compared to "Split Bolt" type connections. Though the submitter's substantiation may not be clear the intent is addressed in the proposal.

WAGNER: The panel statement given for rejection of this proposal is incorrect. Listed Power Distribution Blocks are intended for installation where mounted to the wireway, in accordance with the submitter's substantiation.

8-218 Log #1908 NEC-P08 **Final Action: Reject**
(376-70)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follow:

376.70 Extensions from Metal Wireways. Extensions from wireways shall be made with cord pendants installed in accordance with 400.10 or any wiring method in Chapter 3 that includes a means for equipment ~~grounding~~ bonding. Where a separate equipment ~~grounding~~ bonding conductor is employed, connection of the equipment ~~grounding~~ bonding conductors in the wiring method to the wireway shall comply with 250.8 and 250.12.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.

GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-219 Log #540 NEC-P08 **Final Action: Accept**
(378-3)

Submitter: James M. Daly, General Cable

Recommendation:

Delete 378.3

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."

90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-220 Log #2045 NEC-P08 (378-10) **Final Action: Reject**

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment. The Technical Correlating Committee notes that the Task Group may need to develop a comment to revise 378.12.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the entire text in Section 378.10 as follows:

~~378.10 Uses Permitted.~~

~~The use of nonmetallic wireways shall be permitted in the following:~~

~~(1) Only for exposed work, except as permitted in 378.10(4).~~

~~(2) Where subject to corrosive environments where identified for the use.~~

~~(3) In wet locations where listed for the purpose.~~

~~FPN:Extreme cold may cause nonmetallic wireways to become brittle and therefore more susceptible to damage from physical contact.~~

~~(4) As extensions to pass transversely through walls if the length passing through the wall is unbroken. Access to the conductors shall be maintained on both sides of the wall.~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Not Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-221 Log #2861 NEC-P08 **Final Action: Accept**
(378-23(A))

Submitter: Jim Pauley, Square D Company

Recommendation:

Revise 373.23(A) as shown below:
(A) Deflected Insulated Conductors. Where insulated conductors are deflected within a metallic wireway, either at the ends or where conduits, fittings, or other raceways or cables enter or leave the metallic wireway, or where the direction of the metallic wireway is deflected greater than 30 degrees, dimensions corresponding to one wire per terminal in Table 312.6(A) shall apply.

Substantiation:

The present language leads to inconsistent sizing of wireways. Because of the general reference to 312.6(A), users of the code are applying the wiring space requirements for parallel conductors by using the multiple wires per terminal columns in Table 312.6(A). The inconsistency comes about because if I have the exactly the same number of conductors routed in exactly the same manner but not installed as parallel conductors, I can use the one conductor per terminal column in Table 312.6(A).

For example, take 3-300kcmil conductors installed in parallel. Table 312.6(A) would say that I need a wireway 10 inches in width if the wireway is deflected more than 30 degrees. If I install 3 separate 300kcmil conductors (not paralleled) in the same arrangement, I only need five inches.

Considering that the wireway has to still be large enough to accommodate the number of conductors in accordance with 376.22, it makes little sense to have a "per terminal" sizing for conductor deflection.

This proposal would clear up the issue by stating that you use the one wire per terminal column when determining the gutter width for deflections greater than 30 degrees of the wireway.

The wires per terminal columns make sense when you are doing the terminal bending space requirements, but not for conductor deflection.

Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13
Ballot Not Returned: 1 Cox

8-222 Log #1081 NEC-P08 **Final Action: Reject**
(378-23(B))

Submitter: George H. Little, Little Enterprises

Recommendation:

Raceway or cable entries on opposite sides of the wireway that are offset less than 152 mm (6 in.) are considered straight pulls.

Substantiation:

There seems to be an unnecessary amount of confusion as to when we have a straight pull or when we are deflecting the conductors 30 degrees. By using the approach of measuring with a ruler I feel that the tradesmen and all others will be able to understand this section better. If we have entries that are offset less than 152 mm (6 in.) then 314.28(A)(1) would ask for a dimension of 8 times the metric designator (trade size) of the largest raceway.

Panel Meeting Action: Reject
Panel Statement:

There is no technical substantiation to demonstrate a need to make a change to the present wording.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 13
Ballot Not Returned: 1 Cox

8-223 Log #3056 NEC-P08 **Final Action: Accept in Part**
(378-23(B))

Submitter: Truman C. Surbrook, Michigan State University

Recommendation:

Modify the paragraph as indicated and add a new sentence that deals with providing an equivalent metric designator for cable entries.
(B) Nonmetallic Wireways Used as Pullboxes. Where insulated conductors 4 AWG or larger are pulled through a wireway, the distance between raceway and cable entries enclosing the same conductor shall not be less than ~~that required in 314.28(A)(1) for straight pulls and 314.28(A)(2) for angle pulls~~ eight times the metric designator (trade size) of the largest raceway. When transposing cable size into raceway size, the minimum metric designator (trade size) raceway required for the number and size of conductors in the cable shall be used.

Substantiation:

Section 362.6 of the 1999 NEC was easy to understand. Apparently in the case of a straight pull it was discovered this rule was not consistent with 370-28(A)(1) for straight pulls. It is inappropriate to reference 314.28(A)(1) and 314.28(A)(2) in the case of wireway. The question in the field for electricians and inspectors is when is it a straight pull and when is it an angle pull for a wireway application, and when is it simply conductors running down the wireway. There is too much room for judgment with little information in the rule upon which to make a judgment. Angle pulls should not even be considered for wireway runs except in the rare case where a conductor enters the end of a run and then leaves the wireway at a right angle near the end.
This rule can easily be simplified by using the language of the 1999 NEC but changing the rule to eight times rather than six times the trade diameter of the largest raceway or cable. If a straight pull is involved, then this will force the width of the wireway to be eight times the metric designator of the largest raceway. If the distance between conductor entries is eight times or greater the largest raceway diameter, then the rule of 378.23(A) will apply. Since for most applications the conductors enter and leave the wireway at some point, presently it is a judgment as to when 314.28(A)(1), 314.28(A)(2), or 378.23(A) will apply.
If this rule is to be applied to cable, then there needs to be an explanation as to what metric designator is to be used for a particular cable size as is the case in 314.28(A).

Panel Meeting Action: Accept in Part

The revision to the first sentence of 378.23(B) is not accepted.
The proposed new second sentence is accepted.

Panel Statement:

The rejected proposed language would not permit an angle pull to be considered differently from a straight pull.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 13
Ballot Not Returned: 1 Cox

8-224 Log #541 NEC-P08 **Final Action: Accept**
(378-60)

Submitter: James M. Daly, General Cable

Recommendation:

Delete the text from the first sentence in 378.60 as follows:
Where equipment grounding is required ~~by Article 250~~, a separate equipment grounding conductor shall be installed in the nonmetallic wireway.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."
90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13
Ballot Not Returned: 1 Cox

8-225 Log #1269 NEC-P08 (378-60) **Final Action: Accept**

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

378.60 Grounding.

Where equipment grounding is required ~~by Article 250,~~ a separate equipment grounding conductor shall be installed in the nonmetallic wireway. Separate equipment grounding conductor shall not be required where the grounded conductor is used to ground equipment as permitted in 250.142.

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.

4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.

4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ''grounded in accordance with Article 250'' unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-226 Log #1909 NEC-P08 (378-60) **Final Action: Reject**

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:

378.60 Grounding. Where equipment grounding is required by Article 250, a separate equipment ~~grounding~~ bonding conductor shall be installed in the nonmetallic wireway. Separate equipment ~~grounding~~ bonding conductor shall not be required where the grounded conductor is used to ground equipment as permitted in 250.142.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.

GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-227 Log #2214 NEC-P08 (378-60) **Final Action: Reject**

Submitter: Ted L. Smith, Sr., Encompass Electrical Technologies-Rocky Mountains Inc.

Recommendation:

Revise text to read as follows:
378.60 Grounding. Where equipment grounding is required by Article 250, a separate equipment grounding conductor shall be installed in the nonmetallic wireway. A separate equipment grounding conductor shall not be required where the ~~grounded~~ earth conductor is used to ground equipment as permitted in 250.142.

Substantiation:

The word "Grounded" is often times misused or misunderstood in general application. Misunderstandings arise when discussing grounded conductors and equipment grounding conductors. The general use of the word ground or grounded is often mistakenly used for either situation. A change of the word "grounded" to the word "earth" will help to resolve this misunderstanding and allow for more accurate communication of requirements and standards.
I propose to change the word "grounded" to "earth" throughout the Code book, when the word "grounded" is used in reference to a conductor.
The NFPA has repeatedly stated its desire for unified international standards. The NEC is a great standard with the proper code making process to make it timely and effective. Any move to make the NEC the international standard will improve the building industry. Many countries currently refer to the grounded conductor or neutral as the "earth" conductor. Changing the NEC to this terminology will help to move the NEC towards an international standard.
I believe this change will help with the understanding of the NEC, improve the user friendliness of the NEC and help make the NEC more palatable as an international standard.

Panel Meeting Action: Reject

Panel Statement:

The proposed change does not improve the consistency or usability of the Code. The term affected by the proposal is more in the purview of CMP 5.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-228 Log #1910 NEC-P08 (378-70) **Final Action: Reject**

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follow:
378.70 Extensions from Nonmetallic Wireways. Extensions from nonmetallic wireway shall be made with cord pendants or any wiring method of Chapter 3. A separate equipment grounding conductor shall be installed in, or an equipment ~~grounding~~ bonding connection shall be made to, any of the wiring methods used for the extension.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-229 Log #2028 NEC-P08 **Final Action: Reject**
(380-2)

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete Section 380.2, the title of the Section, and (A) Permitted text, and relocate Uses not permitted from 380.2(B) to new Section 380.12 with the following revisions:

~~380.2 Use.~~

~~(A) Permitted. The use of a multioutlet assembly shall be permitted in dry locations.~~

~~(B)~~380.12 Uses Not Permitted. A multioutlet assembly shall not be installed as follows:

(1) Where concealed, except that it shall be permissible to surround the back and sides of a metal multioutlet assembly by the building finish or recess a nonmetallic multioutlet assembly in a baseboard

(2) Where subject to severe physical damage

(3) Where the voltage is 300 volts or more between conductors unless the assembly is of metal having a thickness of not less than 1.02 mm (0.040 in.)

(4) Where subject to corrosive vapors

(5) In hoistways

(6) In any hazardous (classified) locations except Class I, Division 2 locations as permitted in 501.4(B)(3)

(7) In wet or damp locations.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-230 Log #3517 NEC-P08 **Final Action: Reject**
(380-2(A))

Submitter: Stephen W. McCluer, American Power Conversion Corp

Recommendation:

Revise and add new subparagraph:
(1) in dry locations
(2) when mounted inside equipment used to terminate utilization equipment listed as information technology equipment as permitted in Article 645, provided that the multi-outlet assembly is recognized for the purpose and the overall device in which it is mounted is listed for the application by a nationally recognized testing laboratory. Where more than one multioutlet assembly is installed, the assemblies shall be marked to identify their source.

Substantiation:

Information Technology (IT) devices such as servers are typically manufactured with input cords and plugs to allow the rapid and safe installation/removal of the devices on an energized system. As technology continues to reduce the size of electronic devices, it is not unusual to find up to two-dozen devices in a single equipment bay. The purpose of this proposed paragraph is to ensure that the use of a multioutlet assembly would not be rejected when the assembly is included as part of a larger unit of IT equipment that has been safety agency tested and listed for the application.

One example of a common requirement for IT equipment is dual feeds (so called "A-feed" and "B-feed"), typically powered from separate sources of protected and/or conditioned power. Such a device (for example, a server) would be manufactured with two input cords. This proposal would permit the device to plug into more than one multioutlet assembly mounted in a listed cabinet provided that three conditions are met: (1) each assembly is listed/recognized for the application; (2) the equipment in which the assembly is installed is utilization equipment listed for the purpose; and (3) the sources of power are clearly identified on the strips.

Panel Meeting Action: Reject

Panel Statement:

This is a generalpurpose wiring method and should not pertain to products used within equipment.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-231 Log #943 NEC-P08 **Final Action: Reject**
(380-2(B)(2))

Submitter: James M. Daly, General Cable

Recommendation:

Delete the word "severe" so it reads as follows:
(2) Where subject to ~~severe~~ physical damage.

Substantiation:

There is no distinction between "physical damage" and "severe physical damage" in the Code; a multioutlet assemble should not be subjected to any physical damage.

3.2.5.4 of the 2001 NEC Style Manual also shows "protection against physical damage" as the preferred terminology.

3.2.1. of the 2001 NEC Style Manual states that "The NEC shall not contain references or requirements that are unenforceable or vague." The term "severe" is subjective and vague and should not be used if it can be avoided.

Panel Meeting Action: Reject

Panel Statement:

The current text reflects the panel's understanding of the proper use of multioutlet assembly. The determination between physical damage and severe physical damage remains with the authority having jurisdiction.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

Sequence Number 8-232 is not used.

9-73c Log #3439 NEC-P09 **Final Action: Reject**
(384)

Submitter: Joseph McCann, City of Coral Springs

Recommendation:

Add text to read as follows:
Clearances. Clearances around panelboards shall comply with the provisions of Section 110-26.

Substantiation:

Panelboards with mains and without mains are serviced while energized and should have clearance maintained in front of, for working space.

Panel Meeting Action: Reject

Panel Statement:

Submitter's concerns are addressed in 110.26 and added text is not needed. The panel acknowledges that this Proposal is directed to Article 408.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

8-233 Log #244 NEC-P08 **Final Action: Accept**
(384-2–Strut-Type Channel Raceway)

Submitter: Ryan Emerick Nashville, MI

Recommendation:

At the end of the definition of "Srut-Type Channel Raceway", add the words and cables so the definition reads as follows:
Strut-Type Channel Raceway. A metallic raceway that is intended to be mounted to the surface of or suspended from a structure with associated accessories for the installation of electrical conductors and cables.

Substantiation:

Flat conductor cable and other types of multi-conductor cable is suitable and safe to be run in strut-type channel raceway and needs to be recognized in the definition. In the definition of Rigid Metal Conduit, Electrical Metallic Tubing, and Intermediate Metal Conduit, cables as well as conductors are recognized. There is no reason to not recognize cables in this definition.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-234 Log #2046 NEC-P08 (384-10) **Final Action: Reject**

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the text in 384.10 as follows:

~~384.10 Uses Permitted.~~

~~The use of strut-type channel raceways shall be permitted in the following:~~

~~(1) Where exposed.~~

~~(2) In dry locations.~~

~~(3) In locations subject to corrosive vapors where protected by finishes judged suitable for the condition.~~

~~(4) Where the voltage is 600 volts or less.~~

~~(5) As power poles.~~

~~(6) In Class I, Division 2 hazardous (classified) locations as permitted in 501.4(B)(3).~~

~~(7) As extensions of unbroken lengths through walls, partitions, and floors where closure strips are removable from either side and the portion within the wall, partition, or floor remains covered.~~

~~(8) Ferrous channel raceways and fittings protected from corrosion solely by enamel shall be permitted only indoors.~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Not Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-235 Log #2029 NEC-P08 **Final Action: Reject**
(384-12)

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Insert uses not permitted text to make the text covering uses not permitted totally inclusive as follows:
384.12 Uses Not Permitted.
Strut type channel raceways shall not be used as follows:
(1) Where concealed.
(2) Ferrous channel raceways and fittings protected from corrosion solely by enamel shall not be permitted where subject to severe corrosive influences.
(3) Ferrous channel raceways and fittings protected from corrosion solely by enamel shall not be permitted, except indoors.
(4) In concealed locations, except as extensions of unbroken lengths through walls, partitions, and floors where closure strips are removable from either side and the portion within the wall, partition, or floor remains covered.
(5) In hazardous (classified) locations, except as permitted in Class I, Division 2 hazardous (classified) locations in accordance with 501.4(B)(3).
(6) Where the voltage is greater than 600 volts.
(7) In locations subject to corrosive vapors, except where protected by finishes judged suitable for the condition.
(8) In wet locations.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-236 Log #1911 NEC-P08 **Final Action: Reject**
(384-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follow:
384.60 Grounding. Strut-type channel raceway enclosures providing a transition to or from other wiring methods shall have a means for connecting an equipment ~~grounding~~ bonding conductor. Strut-type channel raceways shall be permitted as an equipment ~~grounding~~ bonding conductor in accordance with 250.118. Where a snap-fit metal cover for strut-type channel raceways is used to achieve electrical continuity in accordance with the listing, this cover shall not be permitted as the means for providing electrical continuity for a receptacle mounted in the cover.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-237 Log #2047 NEC-P08 (386-10) **Final Action: Reject**

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the text in 386.10 as follows:

~~386.10 Uses Permitted.~~

~~The use of surface metal raceways shall be permitted in the following:~~

~~(1) In dry locations.~~

~~(2) In Class I, Division 2 hazardous (classified) locations as permitted in 501.4(B)(3).~~

~~(3) Under raised floors, as permitted in 645.5(D)(2).~~

~~(4) Extension through walls and floors. Surface metal raceway shall be permitted to pass transversely through dry walls, dry partitions, and dry floors if the length passing through is unbroken. Access to the conductors shall be maintained on both sides of the wall, partition, or floor.~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Not Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-238 Log #2030 NEC-P08 **Final Action: Reject**
(386-12)

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Revise the Uses Not Permitted text as follows:
386.12 Uses Not Permitted.
Surface metal raceways shall not be used in the following:
(1) Where subject to severe physical damage, unless otherwise approved
(2) Where the voltage is 300 volts or more between conductors, unless the metal has a thickness of not less than 1.02 mm (0.040 in.) nominal
(3) Where subject to corrosive vapors
(4) In hoistways
(5) Where concealed, except ~~as permitted in 386.10~~ where used as an extension through walls and floors.
(6) Where concealed, except to pass transversely through dry walls, dry partitions, and dry floors if the length passing through is unbroken and access to the conductors is maintained on both sides of the wall, partition, or floor.
(7) In hazardous (classified) locations, except as permitted for Class I, Division 2 hazardous (classified) locations in accordance with 501.4(B)(3).
(8) Under raised floors, except where permitted in 645.5(D)(2).
(9) In wet or damp locations.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-239 Log #944 NEC-P08 **Final Action: Reject**
(386-12(1))

Submitter: James M. Daly, General Cable

Recommendation:

Delete the word "severe" so it reads as follows:
(1) Where subject to ~~severe~~ physical damage, unless otherwise approved.

Substantiation:

There is no distinction between "physical damage" and "severe physical damage" in the Code; a surface metal raceway should not be subjected to any physical damage.
3.2.5.4 of the 201 NEC Style Manual also shows "protection against physical damage" as the preferred terminology.
3.2.1 of the 2001 NEC Style Manual states that "The NEC shall not contain references or requirements that are unenforceable or vague." The term "severe" is subjective and vague and should not be used if it can be avoided.

Panel Meeting Action: Reject

Panel Statement:

The current text reflects the panel's understanding of the proper use of surface metal raceway. The determination between physical damage and severe physical damage remains with the authority having jurisdiction.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-240 Log #594 NEC-P08 **Final Action: Accept**
(386-22)

TCC Action:

The Technical Correlating Committee directs that this proposal be referred to Code-Making Panel 7 for information.

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
Number of Conductors. The number of conductors or cables installed in surface metal raceway shall not be greater than the number for which the raceway is designed. Cables shall be permitted to be installed where such use is ~~permitted~~ not prohibited by the respective cable articles.

Substantiation:

The second sentence of this section was added for the 2002 NEC. The substantiation for adding this provision was that... "The proposed language clarifies that cables, where permitted elsewhere in the Code, are allowed to be used in a raceway." Cable articles are structured so that installation in raceways is not prohibited. The proposed revision will correlate the desired clarification with the cable articles, which do not specifically permit installation in raceways but instead do not prohibit installation in raceways.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-241 Log #1215 NEC-P08 **Final Action: Accept**
(386-22)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text as follows:
386.22 Numbers of Conductors or Cables. The number of conductors or cables installed in surface metal raceway shall not be greater than the number for which the raceway is designed. Cables shall be permitted to be installed where such use is not prohibited ~~permitted~~ by the respective cable articles.

Substantiation:

This change agrees with the panel,s intent and substantiation for placing this language in the 2002 code. It was the panel,s intent to allow cables in raceways unless prohibited in the respective cable article.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: See my Explanation of Negative on Proposal 8-8 (Log #581).

8-242 Log #208 NEC-P08 **Final Action: Reject**
(386-30 (New))

Submitter: Joe Eickholt St. Charles, MI

Recommendation:

Add a new section providing support requirements for surface metal raceway as follows:
386.30 Securing and Supporting. Surface metal raceway shall be secured at all boxes, terminations, and secured to the mounting surface at intervals not exceeding 1.8 m (6 ft) and within 900 mm (3 ft) of each outlet box, cabinet, junction box, or other termination. Sections not exceeding 600 mm (24 in.) shall be permitted to be supported only at the terminations.

Substantiation:

Without having a set code rule for support requirements for surface metal raceway, it becomes a problem with hazardous installations of this product. There are too many installations out there that go unsecured or inadequately supported resulting in potentially dangerous situations. Different manufacturers of these products have differing support requirements if they specify such requirements. The electrical inspector needs a rule with which to judge the adequacy of support of surface metal raceway installations.

Panel Meeting Action: Reject

Panel Statement:

Listed surface metal raceway is required by the product standard to be provided with installation instructions that include the mounting requirements.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

Comment on Affirmative:

LOYD: I agree the proponent did not have adequate substantiation for the prescriptive support requirement proposed. However, I do agree that some support requirements are appropriate and necessary in this article. This proposal should have been accepted in principle with language similar to other strut type surface raceway or as in cable trays. Such as: "Surface metal raceways shall be supported at intervals in accordance with the manufacturer's installation instructions."

8-243 Log #162 NEC-P08 **Final Action: Accept in Principle**
(386-56)

Submitter: W. Creighton Schwan Hayward, CA

Recommendation:

In line 7, remove "~~junction~~", so that the sentence will read:
"Splices and taps in surface nonmetallic raceways without removable covers shall be made only in boxes."

Substantiation:

Outlet, switch, and receptacle boxes are suitable locations for making splices and taps. There is no point in restricting splices and taps to junction boxes.

Panel Meeting Action: Accept in Principle

Revise the submitter's recommendation to read as follows:
In line 7, remove "~~junction~~", so that the sentence will read:
"Splices and taps in surface metal raceways without removable covers shall be made only in boxes."

Panel Statement:

The panel understands that the submitter requested a change to metallic raceway article 386 and not the nonmetallic NEC article. Therefore the proposed word "nonmetallic" has been changed to "metal".

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-244 Log #1912 NEC-P08 **Final Action: Reject**
(386-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
386.60 Grounding. Surface metal raceway enclosures providing a transition from other wiring methods shall have a means for connecting an equipment ~~grounding~~ bonding conductor.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-245 Log #2325 NEC-P08 **Final Action: Accept**
(386-70)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA) / Rep. NEMA

Recommendation:

Revise text as follows:
When combination surface nonmetallic raceways are used for both signaling and for lighting and power circuits, the different systems shall be run in separate compartments identified by stamping, imprinting, or color coding ~~sharply contrasting colors~~ of the interior finish. ~~, and the same relative position of compartments shall be maintained throughout the premises.~~

Substantiation:

The present wording of this section limits the identification to a single method. The new proposal will allow for different methods of compartment identification consistent with markings in other industry standards. Reference to "maintaining the same relative position" is removed as to coincide with the present wording in 388.70.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: The current text makes for a safer installation. We should change 388.70 to match this requirement. The relative position of the compartment should be maintained.

8-246 Log #2048 NEC-P08 (388-10) **Final Action: Reject**

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Delete the text in Section 388.10 as follows:

~~388.10 Uses Permitted.~~

~~Surface nonmetallic raceway shall be permitted as follows:~~

~~(1) The use of surface nonmetallic raceways shall be permitted in dry locations.~~

~~(2) Extension through walls and floors shall be permitted. Surface nonmetallic raceway shall be permitted to pass transversely through dry walls, dry partitions, and dry floors if the length passing through is unbroken. Access to the conductors shall be maintained on both sides of the wall, partition, or floor.~~

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to change the Uses Not Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-247 Log #2031 NEC-P08 **Final Action: Reject**
(388-12)

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Revise the text in 388.12 for uses not permitted as follows:
388.12 Uses Not Permitted.
Surface nonmetallic raceways shall not be used in the following:
(1) Where concealed, except as permitted in 388.2
(2) Where subject to severe physical damage
(3) Where the voltage is 300 volts or more between conductors, unless listed for higher voltage
(4) In hoistways
(5) In any hazardous (classified) location except Class I, Division 2 locations as permitted in 501.4(B)(3)
(6) Where subject to ambient temperatures exceeding those for which the nonmetallic raceway is listed
(7) For conductors whose insulation temperature limitations would exceed those for which the nonmetallic raceway is listed
(8) In wet locations.
(9) In concealed locations, except as an extension through walls and floors.
(10) In concealed locations, except to pass transversely through dry walls, dry partitions, and dry floors if the length passing through is unbroken and access to the conductors is maintained on both sides of the wall, partition, or floor.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

This is a companion proposal to delete Uses Permitted in this Article.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-248 Log #945 NEC-P08 **Final Action: Reject**
(388-12(2))

Submitter: James M. Daly, General Cable

Recommendation:

Delete the word "severe" so it reads as follows:
(2) Where subject to ~~severe~~ physical damage.

Substantiation:

There is no distinction between "physical damage" and "severe physical damage" in the Code; a surface nonmetallic raceway should not be subjected to any physical damage.
3.2.5.4 of the 2001 NEC Style Manual also shows "protection against physical damage" as the preferred terminology.
3.2.1 of the 2001 NEC Style Manual states that "The NEC shall not contain references or requirements that are unenforceable or vague." The term "severe" is subjective and vague and should not be used if it can be avoided.

Panel Meeting Action: Reject

Panel Statement:

The current text reflects the panel's understanding of the proper use of surface nonmetalic raceway. The determination between physical damage and severe physical damage remains with the authority having jurisdiction.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-249 Log #595 NEC-P08 **Final Action: Accept**
(388-22)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation:

Revise text to read as follows:
Number of Conductors. The number of conductors or cables installed in surface nonmetallic raceway shall not be greater than the number for which the raceway is designed. Cables shall be permitted to be installed where such use is ~~permitted~~ not prohibited by the respective cable articles.

Substantiation:

The second sentence of this section was added for the 2002 NEC. The substantiation for adding this provision was that... "The proposed language clarifies that cables, where permitted elsewhere in the Code, are allowed to be used in a raceway." Cable articles are structured so that installation in raceways is not prohibited. The proposed revision will correlate the desired clarification with the cable articles, which do not specifically permit installation in raceways but instead do not prohibit installation in raceways.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-250 Log #1209 NEC-P08 **Final Action: Accept**
(388-22)

Submitter: Richard E. Loyd Sun Lakes, AZ

Recommendation:

Revise text to read as follows:
388.22 Number of Conductors or Cables. The number of conductors or cables installed in surface metal raceway shall not be greater than the number for which the raceway is designed. Cables shall be permitted to be installed where such use is not prohibited ~~permitted~~ by the respective cable articles.

Substantiation:

This change agrees with the panel's intent and substantiation for placing this language in the 2002 code. It was the panel's intent to allow cables in raceways unless prohibited in the respective cable article.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-251 Log #246 NEC-P08 **Final Action: Reject**
(388-30 (New))

Submitter: Michael Bushey Bad Axe, MI

Recommendation:

Add a new section providing support requirements for surface nonmetallic raceway as follows:
388.30 Securing and Supporting. Surface nonmetallic raceway shall be secured to the mounting surface at intervals not exceeding 900 mm (3 ft) and within 300 mm (12 in.) of each outlet box, cabinet, junction box, or other termination. Sections of raceway not exceeding 300 mm (12 in.) shall be permitted to be supported only at the terminations unless of a listed adhesive attachment type.

Substantiation:

There are presently no support requirements for surface nonmetallic raceway. Installations that are not adequately supported will sag away from the mounting surface exposing the raceway to increased danger of being damaged. Manufacturers do not provide adequate mounting instruction for the installer or for the inspector. A code rule will eliminate this deficiency.

Panel Meeting Action: Reject

Panel Statement:

Listed surface nonmetallic raceway is required by the product standard to be provided with installation instructions that include the mounting requirements.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

Comment on Affirmative:

LOYD: See my Comment on Affirmative on Proposal 8-242 (Log #208).

8-252 Log #161 NEC-P08 **Final Action: Accept**
(388-56)

Submitter: W. Creighton Schwan Hayward, CA

Recommendation:

In line 7, remove "~~junction~~", so that the sentence will read:
"Splices and taps in surface nonmetallic raceways without removable covers shall be made only in boxes."

Substantiation:

Outlet, switch, and receptacle boxes are suitable locations for making splices and taps. There is no point in restricting splices and taps to junction boxes.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-253 Log #542 NEC-P08 **Final Action: Accept**
(388-60)

Submitter: James M. Daly, General Cable

Recommendation:

Delete text as follows:
Where equipment grounding is required ~~by Article 250~~, a separate equipment grounding conductor shall be installed in the raceway.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified." 90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-254 Log #1270 NEC-P08 **Final Action: Accept**
(388-60)

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

388.60 Grounding. Where equipment grounding is required ~~by Article 250~~, a separate equipment grounding conductor shall be installed in the raceway.

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ''grounded in accordance with Article 250'' unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-255 Log #1913 NEC-P08 **Final Action: Reject**
(388-60)

Submitter: Donald A. Ganiere Ottawa, IL

Recommendation:

Revise text as follows:
388.60 Grounding. Where equipment ~~grounding~~ bonding is required by Article 250, a separate equipment ~~grounding~~ bonding conductor shall be installed in the raceway.

Substantiation:

This is a coordinating proposal to my proposal to change the term "equipment grounding conductor" to "equipment bonding conductor" in Article 250.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-1.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DUREN: See my Explanation of Negative for 8-1.

Comment on Affirmative:

DAUBERGER: See my Comment on Affirmative on Proposal 8-1.
GRIFFITH: See my Comment on Affirmative on Proposal 8-1 (Log #2453h).

8-256 Log #2326 NEC-P08 **Final Action: Accept**
(388-70)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA) / Rep. NEMA

Recommendation:

When combination surface nonmetallic raceways are used for both signaling and for lighting and power circuits, the different systems shall be run in separate compartments identified by stamping, imprinting, or color coding ~~sharply contrasting colors~~ of the interior finish.

Substantiation:

The present wording of this section limits the identification to a single method. The new proposal will allow for different methods of compartment identification consistent with markings in other industry standards.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-257 Log #2032 NEC-P08 **Final Action: Reject**
(390-2)

TCC Action:

The Technical Correlating Committee directs the panel to reconsider the proposal to correlate with the actions Code-Making Panel 7 took on similar proposals. The present text creates inherent misunderstanding in the uses permitted versus not permitted and the panel has not addressed that particular issue. The panel should consider modifications to the language to place any necessary restrictions in the uses not permitted section. The Technical Correlating Committee is directing the chair of Code-Making Panel 8 to appoint members to work with members of the Usability Task Group to develop comments that would make the approach acceptable to the panel. This action will be considered by the panel as a public comment.

Submitter: National Electrical Code Technical Correlating Committee

Recommendation:

Revise 390.2 as follows:
390.2 ~~Use.~~
~~(A) Permitted. The installation of underfloor raceways shall be permitted beneath the surface of concrete or other flooring material or in office occupancies where laid flush with the concrete floor and covered with linoleum or equivalent floor covering.~~
~~(B)~~ Not Permitted. Underfloor raceways shall not be installed
(1) where subject to corrosive vapors or
(2) in any hazardous (classified) locations, except as permitted by 504.20 and in Class I, Division 2 locations as permitted in 501.4(B)(3).
(3) Unless made of a material judged suitable for the condition or unless corrosion protection approved for the condition is provided, ferrous or nonferrous metal underfloor raceways, junction boxes, and fittings shall not be installed in concrete or in areas subject to severe corrosive influences.
(4) In installations other than beneath the surface of concrete or other flooring material or other than in installations in office occupancies where laid flush with the concrete floor and covered with linoleum or equivalent floor covering.

Substantiation:

During the processing of the 2002 NEC, a code-making panel identified concerns with the concept of trying to describe the "uses permitted" for a particular wiring method and not be in conflict with the "uses not permitted". In some cases, the permitted and "not permitted" uses can be easily segregated. However, there are a number of instances where the "use permitted" ends up being the exception to a "use not permitted". Because of the problems becoming apparent with the lists, the Correlating Committee asked the Usability Task Group to review the issue and make a recommendation on how to best handle the lists.

This is one of the proposals that resulted from that review. The overall recommendation is that the "Uses Permitted" section be deleted (via a separately submitted proposal) and the "Uses Not Permitted" section be revised to properly accommodate any limitations from the uses permitted language. With these revisions, the NEC language would only cover those specific "uses not permitted" for a wiring method. All applications not covered by those limitations would be acceptable.

This would make it easier for inspectors, manufacturers, electricians, and others in the electrical industry to determine what uses were not permitted for this wiring method without making it necessary for the Code Panels to provide a running laundry list of uses permitted.

The Useability Task Group on Uses Permitted/Uses Not Permitted is comprised of Mr. George Dauberger, Mr. John Minick, Mr. Jim Dollard, Mr. Dick Owen, Mr. Phil Sutherland, and Mr. Mark Ode.

Panel Meeting Action: Reject

Panel Statement:

Refer to the panel action and statement on Proposal 8-102.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-258 Log #952 NEC-P08 **Final Action: Accept in Principle**
(390-5)

Submitter: Roger D. Wilson, The Austin Company

Recommendation:

The following sentence should be added to Section 390.5:
"The ampacity adjustment factor, in Article 310, shall also apply to underfloor raceways".

Substantiation:

Relatively few electrical design engineers, electrical inspectors, plan-checkers, and electricians realize (or agree) that the ampacity adjustment factors, of Article 310, must also be applied to conductors in underfloor raceways. This has resulted in many installations where such raceways are filled to 40 percent, with no derating. The common belief seems to be that such derating would defeat much of the advantage of using this type of raceway. The NEC should clearly state this requirement in the text of Article 390.

Panel Meeting Action: Accept in Principle

Add the following as a new 90.17:
"390.17 Ampacity of Conductors. The ampacity adjustment factors, in 310.15(B)(2), shall apply to conductors installed in underfloor raceways".

Panel Statement:

The revised text and location more properly place the intended requirement into the Code.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-259 Log #2734 NEC-P08 **Final Action: Reject**
(Chapter 3)

Submitter: Melvin K. Sanders, TECo., Inc.

Recommendation:

Relocate Article 392 Cable Tray so it will follow Article 300 and renumber.

Substantiation:

The new numbering system in the 2002 NEC moved the cable tray article to follow all the wiring methods. Cable trays are a support system for cable and raceway wiring methods and are not a wiring method. By placing them at the end of Chapter Three this can be misunderstood, and moving it toward the beginning of Chapter Three will result in a more logical placement.

Panel Meeting Action: Reject

Panel Statement:

The panel does not have the authority to change article numbers. The panel recommends retaining the current numbering. The panel disagrees that placing Article 392 immediately after Article 300 is a more logical placement. The NEC Style Manual indicates that Chapter 3, Wiring Methods, includes Articles 300 through 399.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-260 Log #431 NEC-P08 **Final Action: Reject**
(392-1)

Submitter: Hugh D. Butler, Jr. Carrollton, GA

Recommendation:

Revise text to read as follows:
392.1 Scope. This article covers cable tray systems and associated wiring methods, including ladder...(remainder of text is the same).

Substantiation:

By definition provided in 392.2, the scope of the article clearly does not cover wiring methods associated with cable tray systems.

Panel Meeting Action: Reject

Panel Statement:

The article does not cover wiring methods. Wiring methods are covered by their respective article. Wiring methods are addressed only as is necessary to complement the cable tray requirements.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

DABE: This change in scope would more accurately reflect the requirements in the article.

8-261 Log #2778 NEC-P08 (392.1) **Final Action: Accept**

TCC Action:

The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee "Accepts" the Panel Action.

Submitter: Richard J. Buschart, Cable Tray Institute

Recommendation:

Revise text as follows:
Add the term ANSI before the words NEMA-VE-1
(See ANSI NEMA-VE-1).

Substantiation:

NEMA VE-1 is approved as an ANSI Standard and should be indicated as such.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-262 Log #705 NEC-P08 (392-3) **Final Action: Accept in Principle**

Submitter: Dan Leaf Palmdale, CA

Recommendation:

Revise first sentence:
Cable tray shall be permitted to be used as a support system for ~~services~~ service-entrance conductors, feeders, branch circuits... (remainder unchanged).

Substantiation:

Edit. To correlate with 392.2 which indicates the support system is for cables and raceways. "Services", by definition includes service equipment. This section is a rule; 392.2 is a definition.

Panel Meeting Action: Accept in Principle

In the submitter's recommendation, replace the words "service-entrance conductors" with the words "service conductors."

Panel Statement:

The words "service conductors" apply to the conductors from the service point to the service disconnecting means, while the proposed words cover only a portion of the service conductor length.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-263 Log #921 NEC-P08 **Final Action: Reject**
(392-3(A))

Submitter: James M. Daly, General Cable

Recommendation:

Add a new paragraph after 392.3(A) to read as follows:
Single conductors or multiconductor cables that are listed and marked as either MV-90 or MC or MV-105 or MC shall be permitted to be installed in cable tray.

Substantiation:

The current text is not explicit regarding the installation of medium voltage Type MC cables in cable tray in other than industrial establishments. Other sections of the Code permit installation of medium voltage Type MC cable in cable tray in any occupancy but it is not clear in Article 392.

In accordance with the NEC, UL 1072 permits single and multiconductor medium voltage cables that comply with the requirements of both UL 1072, Medium-Voltage Power Cables, and UL 1569, Metal-Clad Cables, to be listed and labeled with the dual designation of either "MV-90 or MC" or "MV-105 or MC". These designations permit the cable to be installed as either Type MV or MC cable as authorized by the respective Code Articles.

In Article 330, the following sections address medium voltage type MC cable:
330.112(B) defines the insulated conductors required for over 600 V.
330.10(A)(6) permits Type MC cable of all voltages to be installed in cable tray.
330.10(A)(8) permits Type MC cable of all voltages to be installed as open wiring.
330.24(C) defines the minimum bending radius for shielded conductors that would only apply to cables rated over 2 kV, thus medium voltage, as defined in 328.2.

392.3 stipulates that "Cable tray shall be permitted to be used as a support system..." and that "Cable tray installations shall not be limited to industrial establishments."

392.3(A) states that "The wiring methods in Table 392.3(A) shall be permitted to be installed in cable tray systems under the conditions described in their respective articles and sections". Table 392.3(A) lists "Metal-clad cable" as an acceptable wiring method for installation in cable tray without any restriction on the type of occupancy.

392.3(B)(2) addresses single and multiconductor Type MV cable, not medium voltage cable that is also listed as Type MC. Single and multiconductor Type MV has an outer nonmetallic covering; it does not have the metallic sheath or armor required on Type MC cable.

Type MC cable containing medium voltage insulated conductors is currently authorized to be installed as open wiring in any occupancy; no restrictions. The open wiring installation is not limited to industrial establishments. Does it make any sense to authorize an open wiring installation of a medium voltage Type MC cable (Type MV-90 or MC) next to a cable tray in a non-industrial occupancy and not allow the same identical cable to be installed in the adjacent cable tray, which would provide support and additional physical protection for the cable?

I agree with the restriction in 392.3(B(1) and (2) that single conductors of any voltage should be limited to industrial establishments.

Now, if the Code-Making Panel believes that Table 392.3(A) already authorizes the installation of medium-voltage Type MC cable in cable tray in any occupancy and no change in the Code is required, the Code-Making Panel can reject the proposal and include such a statement in the substantiation. This will correct the Panel Statement made on Proposal 8-17 in the 2001 ROP.

Panel Meeting Action: Reject

Panel Statement:

The language of this proposal would permit Type MV cable, to be used in cable tray installations in all occupancies. Because of the increased hazards associated with the higher operating voltages of Type MV cable it is limited to those industrial establishments identified in 328.10(3).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-264 Log #3459 NEC-P08 **Final Action: Reject**
(392-3(B))

Submitter: Charles M. Trout, Maron Electric Co. Inc.

Recommendation:

Delete the entire second sentence starting with the words "in industrial establishments only, where the conditions of maintenance and supervision".

Substantiation:

The National Electrical Code is prescriptive code. To say "where the conditions of maintenance and supervision ensure that only qualified persons service the installation," is a performance requirement. Without prescriptive requirements indicating whether this qualified person is an employee of the owner of the premises or is a separately contracted person and the Authority Having Jurisdiction has a means of verification of the continued employment of the qualified person and whether the qualified person has been verified by the authority having jurisdiction as meeting the definition of a qualified person as shown in the definitions of this Code no prescriptive requirements have been followed.

To permit relaxation of the safety requirements of this Code without establishing a positive guarantee that the safety of persons and property is indisputably assured is a reprehensible act.

Panel Meeting Action: Reject

Panel Statement:

The substantiation does not demonstrate a need to delete this exception when appropriately applied. This exception does not relax the NEC safety requirements, as additional restrictions of conditions of maintenance and supervision are ensuring that only qualified persons service the installation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

POHOLSKI: See my Explanation of Negative for Proposal 8-183.

8-265 Log #203 NEC-P08 **Final Action: Accept**
(392-3(B)(1) (a))

Submitter: Nate Periard Midland, MI

Recommendation:

In the last line of paragraph 392.3(B)(1)(a), change 230 mm to 225 mm.

Substantiation:

The 230 mm as equivalent to 9 in. is not consistent with other references in this article such as Table 392.9 and Table 392.10(A). Inconsistency in SI unit conversion will be confusing to the electrician working in the field.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-266 Log #1649 NEC-P08 **Final Action: Reject**
(392-3(B)(1)a)

Submitter: Richard J. Buschart, Cable Tray Institute / Rep. NEMA

Recommendation:

Delete the last sentence in its entirety.

~~Where 1/0 AWG through 4/0 AWG single-conductor cables are installed in ladder cable tray, the maximum allowable rung spacing for the ladder cable tray shall be 230 mm (9 in.).~~

Substantiation:

There has been no demonstrated safety issue with installing single conductor cables in ladder cable tray with rung spacings larger than 230 mm (9 in.). It is permitted in the Canadian code.

Panel Meeting Action: Reject

Panel Statement:

No alternate spacing requirement with supporting technical data was proposed to demonstrate a maximum spacing capability.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-267 Log #3154 NEC-P08 **Final Action: Reject**
(392-3(B)(1)(c))

Submitter: Robert Krystkiewicz, Static Power Conversion Services

Recommendation:

Revise text as follows:
They shall be ~~4 AWG~~ or larger.
They shall be 6 AWG or larger.

Substantiation:

The telecom industry goes by the Belcore specs from Telcordia. By changing the wire size, the NEC would meet the Telcordia and ANSI standard.
Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement:

There is no technical substantiation to support the change. This section covers industrial applications that may be more critical than Telcordia or Belcore specs.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-268 Log #1271 NEC-P08 **Final Action: Accept**
(392-3(B)(2))

Submitter: David H. Kendall, Carlon, Lamson & Sessions

Recommendation:

Revise text to read as follows:

(2) Medium Voltage. Single- and multiconductor medium voltage cables shall be Type MV cable ~~(Article 328)~~. Single conductors shall be installed in accordance with 392.3(B)(1).

Substantiation:

Per the National Electrical Code Style Manual, Section 4.1, references covered by 90.3 shall not be used.
4.1 References to Other *NEC* Rules. Use references to improve clarity of the rule. Avoid redundant use of references. Do not use a reference if the requirement is already covered by 90.3. Explanatory references shall be in fine print notes.
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as ''grounded in accordance with Article 250'' unless additional conditions are specified. References to parts within articles shall be permitted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-269 Log #543 NEC-P08 **Final Action: Accept in Principle**
(392-3(E))

Submitter: James M. Daly, General Cable

Recommendation:

Revise text as follows:
(E) Nonmetallic Cable Tray. ~~In addition to the uses permitted elsewhere in Article 392, nonmetallic~~ Nonmetallic cable tray shall also be permitted in corrosive areas and in areas requiring voltage isolation.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified." 392.3 specifies the uses permitted.

Panel Meeting Action: Accept in Principle

Revise 392.3(E) of the code to read as follows:
(E) Nonmetallic Cable Tray. In addition to the uses permitted elsewhere in 392.3, nonmetallic cable tray shall be permitted in corrosive areas and in areas requiring voltage isolation.

Panel Statement:

The revised wording accomplishes the objective of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-270 Log #946 NEC-P08 **Final Action: Reject**
(392-4)

Submitter: James M. Daly, General Cable

Recommendation:

Delete the word "severe" in the first sentence so it reads as follows;
Cable tray systems shall not be used in hoistways or where subject to ~~severe~~ physical damage.

Substantiation:

There is no distinction between "physical damage" and "severe physical damage" in the Code; a cable tray system should not be subjected to any physical damage.
3.2.5.4 of the 2001 NEC Style Manual also shows "protection against physical damage" as the preferred terminology.
3.2.1 of the 2001 NEC Style Manual states that "The NEC shall not contain references or requirements that are unenforceable or vague." The term "severe" is subjective and vague and should not be used it it can be avoided.

Panel Meeting Action: Reject

Panel Statement:

The current text reflects the panel's understanding of the proper use of cable tray. The determination between physical damage and severe physical damage remains with the authority having jurisdiction.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-271 Log #1740 NEC-P08 **Final Action: Accept**
(392-4)

Submitter: Marcelo M. Hirschler, GBH International / Rep. Fire Retardant Chemicals Association, Plenum Cable Association, and Vinyl Institute EOTS

Recommendation:

Revise text to read as follows:
392.4 Uses Not Permitted.
Cable tray systems shall not be used in hoistways or where subject to severe physical damage. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces ~~environmental airspaces,~~ except as permitted in 300.22, to support wiring methods recognized for use in such spaces.

Substantiation:

[Text of Proposal 8-271 substantiation is shown on page 2329]

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox

8-272 Log #1121 NEC-P08 **Final Action: Reject**
(392-6(A))

Submitter: William D. Wilkens, Anixter Inc.

Recommendation:

The first sentence of the second paragraph should be changed to read:
"Where cable trays support individual conductors OR CABLES and where the conductors OR CABLES pass from one cable tray...".

Substantiation:

In Proposal #8-32 (Log # 1168) of the May 2001 ROP, Panel Member Griffith commented as follows:
"Although I agree with the submitter's revision as proposed, it is believed that this sentence, which was new in the last revision of the code, should have always applied to cables as well as individual conductors. The practice involving up to 6 foot cable tray discontinuities is universally applied to cables, as well as individual conductors."
It thus appears that the addition of cables to the 6 foot rule was intended by the Panel but that it was unintentionally left out of the 2002 NEC. There appears to be no technical or safety related reason why cables should be excluded from the 6 foot rule.

Panel Meeting Action: Reject

Panel Statement:

Cables are covered in the first paragraph of 392.6(A). A distance of 1.8 m (6-ft) is contradictory to some of the requirements in the cable articles.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 1

Ballot Not Returned: 1 Cox

Explanation of Negative:

GRIFFITH: Panel action for this proposal should have been to Accept in Principle and the last sentence in the first paragraph of 392.6(A), should have been revised to read as follows:
"Unless such practice is prohibited by their corresponding articles, cables shall be supported by the tray system in accordance with the requirements for individual conductors." Paragraph 2, which covers individual conductor support, would then continue to read as presently written.
With the present panel action on this proposal, there remains a "disconnect" insofar as support of certain cables, permitted to be installed in tray by Table 392.3(A), is concerned. Although several articles covering cable systems, including 800, 770, 760, and even 725 for type PLTC cable, allow installation of certain cited cables in tray, the articles are totally silent on cable support requirements for such tray installations. There are, therefore, no present rules on how these cables should be supported when installed in tray with 392.6(A) as currently written. Further, type ITC cable (article 727) is permitted to be supported as presently permitted for individual conductors in 392.6(A), and yet, most if not all, type ITC cable - being of almost identical construction - is also marked type PLTC. It makes no sense to have the support rules apply for ITC, but not for PLTC, especially when there is nothing in article 725 to prohibit such practice. Such installations of PLTC cable in tray are, in fact, widespread, as are installation of cables permitted in tray by articles 760, 770 and 800.
My proposed rewrite of the last sentence in the first paragraph of 392.6(A) would capture the submitter's intent and eliminate the present "disconnect", while at the same time addressing the panel's concern for any possible contradictory support requirements in specific cable articles as expressed in the Panel Statement. I, therefore, urge the panel to reconsider and change the action to Accept in Principle.

8-273 Log #544 NEC-P08 **Final Action: Accept in Principle**
(392-7(A))

Submitter: James M. Daly, General Cable

Recommendation:

Delete text as follows:
(A) Metallic Cable Trays. Metallic cable trays that support electrical conductors shall be grounded as required for conductor enclosures ~~in Article 250~~.

Substantiation:

4.1.1 of the NEC Style Manual states that "references shall not be made to an entire article unless additional conditions are specified."
90.3 states that Chapters 1, 2, 3 and 4 apply generally.

Panel Meeting Action: Accept in Principle

Panel Statement:

Refer to the panel action and statement on Proposal 8-274. The revised text meets the intent of the submitter.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13

Ballot Not Returned: 1 Cox