(Log #4457)

1- 203 - (110): Reject
SUBMITTER: David E. Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education
RECOMMENDATION: Add the following text:
"...and like locations including the underside of equipment where exposed to moisture."
SUBSTANTIATION: The use of indoor-type connectors on underside of outdoor equipment such as meterbases, AC compressors, and disconnects is common practice. This appears to violate Section 100-3(b), and 90-4 is commonly construed as requiring written authorization. Nevertheless, given that manufacturers do provide for drainage by the way their cabinets' sheet metal does not quite meet at the bottom, the justification for this practice appears to rest on the "like locations" category in this section. However, the other examples are structural. Possible Code change aside, a committee statement on this matter in the ROP would be useful.
PANEL ACTION: Reject.
PANEL STATEMENT: The proposal appears to address Article 100 definition of Damp Location. The substantiation suggests an enforcement problem and not a problem with the definition.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #CP101)

1- 203a - (110-1): Accept
Note: 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. The Technical Correlating Committee directs that Code-Making Panel 1 correlate this Proposal with the information in the Technical Correlating Committee Note on Proposal 1-308. This action will be considered by the Panel as a Public Comment.
SUBMITTER: CMP 1
RECOMMENDATION: Add the following to Article 110.
"110-1 Scope: This article covers general requirements for the examination and approval, installation and use, access to and spaces about electrical conductors and equipment."
SUBSTANTIATION: CMP-1 complies with the direction of the TCC and Section 2.2.1 of the Style Manual to add a scope statement to Article 110.
PANEL ACTION: Accept.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias
COMMENT ON AFFIRMATIVE:
COX: Recommend adding the following sentence to the Panel Action.
"The Panel recognizes that the Technical Correlating Committee has responsibility over the Scope of Articles and submits this proposal for consideration and recommends approval of the proposed language."

(Log #4314)

1- 204 - (110-3): Reject
SUBMITTER: Scott T. MacDonald, Collyn Ferris, Aquadoor Inc.
RECOMMENDATION: Add the following text:
The location, application, and life expectancy of the safety grounding systems and the determination as to their suitability.
SUBSTANTIATION: a. In real life, the location of bonding clips, grounding clips, and their wires, is often left to the equipment installer. They sometimes cut corners by not removing the paint below a bonding clip or choosing a place that is easy to ground but may not be the best spot due to motion, paint, corrosion, part to part resistance, etc., etc. The bonding/grounding location should be predetermined, if possible, by electrical engineering experts.
b. Application refers to, is this the proper wire, clip, screw, and metal?
c. Life expectancy means, how long will the part last, and should it last as long as the product?
d. The example I can give in my field, pool covers, is many pool cover companies were using aluminum bonding clips that were factory installed over paint. In this situation aluminum bonding clips are not to code and the life expectancy of the clip is very low. This should have been reviewed by the listing company and stopped/corrected before listing.
PANEL ACTION: Reject.
PANEL STATEMENT: The list in Section 110-3 is not intended to be all-inclusive, but examples of evaluation considerations. The concerns of the submitter appear to be covered in the existing list.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2106)

1- 205 - (110-3(a)(1), FPN): Reject
SUBMITTER: Kari Barrett, Chemical Manufacturers Assn.
RECOMMENDATION: Revise the second sentence of the fine print note to read:
"Suitability of equipment may be evidenced by listing, labeling, or for specialized or custom designed equipment, by manufacturer's certification, when manufacturer's test data or engineering evaluation are supplied by the owners or installers."
SUBSTANTIATION: Many times during examination of equipment, the manufacturer's test data and engineering evaluations are not in evidence. There have been cases where complete electrical rework has been required instead of evaluating the data and evaluations.
By adding this clarifying sentence to the FPN, the Authority Having Jurisdiction should have a better understanding and consider alternate suitability justifications.
PANEL ACTION: Reject.
PANEL STATEMENT: The proposed wording does not improve the application of provisions in this Section. The example of listing and labeling merely identifies a source of information upon which the Authority Having Jurisdiction can rely for support of approval of equipment but it does not limit it to that source. Listing and labeling are based on the compliance with recognized product safety standard. The proposed new wording is likely to cause confusion because it can be interpreted to have various meanings. The Authority Having Jurisdiction has the responsibility under the existing Code wording to approve equipment, and as such, has the authority to review applicable data regarding one-of-a kind or custom designed equipment and decide upon approval.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 11
NEGATIVE: 1
NOT RETURNED: 1 Macias
EXPLANATION OF NEGATIVE:
PRICHARD: The proposal would add a FPN, not a mandatory rule. This could lead some Authorities Having Jurisdiction to at least consider alternate suitability justifications. Many times, the owner or installer can provide manufacturer's test data or engineering evaluations to the Authority Having Jurisdiction.

(Log #1809)

1- 205a - (110-3(b), FPN (New)): Reject
SUBMITTER: Nicholas Ludlam, Factory Mutual Research
RECOMMENDATION: Add a fine print note to read as follows:
FPN: Installation instructions may be provided on a certificate supplied with the apparatus.
SUBSTANTIATION: The IEC 60079 Series of standards, on which the ANSI/ISA S12 series of standards, and ANSI/UL2279 are both based, require a certificate number as part of the apparatus marking. ISA and UL have both taken this requirement out of their versions of the Zone standards. Manufacturers are increasingly asking for certificates as evidence to users that the product is Listed. If the format of the certificate number is consistent between the NRTLs then the users and the AHJs will be able to find the information needed quickly, especially on items such as Ex components. See also proposal on 505(10)(b).
PANEL ACTION: Reject.
PANEL STATEMENT: The existing wording in this section does not prohibit supplying installation instructions on a certificate supplied with equipment.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #1137)

1- 206 - (110-3(c) (New)): Reject
SUBMITTER: Bob K. Middleton, Rep. State of Idaho
RECOMMENDATION: Add a new Section 110-3(c) to read:
"The receptacles required by this Code shall have the proper voltage and the other equipment required by this Code shall function upon completion of the project."
SUBSTANTIATION: The intent of the Code is that everything shall work when the job is complete, but I can find nothing in the Code that states this.
PANEL ACTION: Reject.
PANEL STATEMENT: The Submitter is referred to Section 90-1(b). Compliance with the provisions of the Code will result in an installation that is essentially free from hazard. Adequacy or performance of the resulting installation is not necessarily contemplated by the Code provisions and is not within the purview of the AHJ.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias
COMMENT ON AFFIRMATIVE:
ANTHONY: This seems to be a perfectly reasonable expectation; that receptacles should be capable of supplying potential to utilization equipment at the completion of a project. One can visualize, however, situations in which operational or contractual situations result in de-engerized receptacles, if only temporarily. If, however, receptacles do not work because of an error in the construction, it should be a signal that a dangerous condition may exist-something completely within the purview of the Authority Having Jurisdiction. The issues are related and the submitter has raised an important point even though not exclusively a "code point".

(Log #2760)

1- 207 - (110-3(c)): Reject
SUBMITTER: Joseph A. Tedesco, Nat'l Technology Transfer, Inc.
RECOMMENDATION: Add new text:
Permanent wiring abandoned in place shall be tagged or otherwise identified at its termination and junction points as "Abandoned in Place" or removed from all accessible areas and insulated from contact with other live electrical wiring or devices.
SUBSTANTIATION: Electrical fire safety section 3-2.4 in NFPA 1 Fire Prevention Code should be added to NEC 2002.
PANEL ACTION: Reject.
PANEL STATEMENT: The submitter has not provided any substantiation to address such a broad requirement. The establishment and enforcement procedures concerning maintenance requirements and identification of electrical equipment not in use is better left to other codes and documents such as NFPA 1.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 11
NEGATIVE: 1
NOT RETURNED: 1 Macias
EXPLANATION OF NEGATIVE:
ANTHONY: This seems to me to be a modest proposal. It does not require removal of old cable which, while recommended, is not always practical. It simply asks for them to be tagged from this point forward. Furthermore, it is theoretically possible - though, admittedly unlikely - that voltages can be induced in abandoned cables in proximity to energized cables. A combustible material in contact with a live end could pose a fire hazard.

(Log #3895)

1- 208 - (110-4): Reject
SUBMITTER: Joseph Misrahi, PBS&J
RECOMMENDATION: Delete: "The voltage rating of the equipment shall not be less than the nominal voltage of a circuit to which it is connected."
SUBSTANTIATION: In general, motor voltage ratings are less than nominal voltages shown in Article 100.
PANEL ACTION: Reject.
PANEL STATEMENT: The voltage rating of motors falls within the ranges associated with nominal voltages in Voltage Ratings for Electric Power Systems and Equipment (60 Hz), ANSI C84.1. The nominal voltages referenced in Article 100 are examples only.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2886)

1- 209 - (110-7): Reject
SUBMITTER: James Maldonado, City of Tempe, AZ/Rep. Central Arizona Chapter IAEI
RECOMMENDATION: Add a new paragraph to the end of section to read as follows:
All equipment rated at 1,000 amperes or more shall be tested in conformance with UL Standard 869, or 891 for insulation breakdown prior to its being energized. This test shall be performed by an independent testing facility or agency approved by the Authority Having Jurisdiction.
SUBSTANTIATION: This section only refers to wiring being free from short circuits or grounds. However, all equipment should be tested for insulation integrity after installation and prior to its being energized. Experience has shown that things occasionally happen to electrical switchboards, panel boards, motor control centers and other similar large pieces of equipment when it leaves the manufacturing facility, until the time it is off loaded at the job site and finally installed. Insulating bushings have cracked, hardware has loosened, insulation integrity can be compromised and not all occurrences have been visible to visual observation or have been detected by the use of a DC meg-ohm meter.
However, an AC high potential test such as the requirements of UL 869, or 891, can pick up these ground faults or shorts. Additionally, much of this large equipment is assembled in the field, leaving chances for tools being left in the equipment, or shavings of metal from phase to ground or any hardware or tools being left in the equipment, and never found until after the equipment is energized. Equipment smaller than 1000 amperes usually does not require field assembly and is more easily transported to its final installation destination. This test required by this proposal are nondestructive and have exposed many problems prior to energization. This has been a requirement in the Phoenix metro area for over 6 years.
PANEL ACTION: Reject.
PANEL STATEMENT: No technical substantiation was submitted to warrant a requirement to field test all equipment rated at 1,000 amps or more as outlined in the proposal. Section 110-12 presently addresses the concerns of the submitter. It is not the purpose of the National Electrical Code to establish and limit which product-testing standards may be used. In this case, standards other than those outlined in the proposal may be more appropriate.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3641)

1- 210 - (110-9): Reject
SUBMITTER: Jim Brozer, Acton, MA
RECOMMENDATION: Add a new third paragraph to Section 110-9 to read as follows:
"Multi-pole circuit breakers shall have a single-pole interrupting rating sufficient for the nominal circuit voltage and current that is available at the line terminals of the circuit breaker when utilized on corner grounded systems, resistance grounded systems, ungrounded systems and center point grounded delta systems."
SUBSTANTIATION: This new third paragraph is needed to make it clear that multi-pole overcurrent devices, when applied on certain systems, must have an adequate single-pole interrupting rating in order to assure that the circuit will be opened safely.
Single-pole interrupting ratings become critical when full voltage can appear across only one pole. Take for example a resistance grounded system. This type of system is popular with industrials because the first fault to ground is of such a low value that the phase overcurrent devices do not open. The plant continues to run. Maintenance crews plan the shutdown to fix the fault. No unplanned downtime. Unfortunately, some facilities are understaffed, and the original fault to ground may remain for many days or even weeks. When this occurs, it becomes very possible for a second phase to go to ground, thus creating a phase-to-phase fault. This can put full voltage across only one pole of the overcurrent device. It is for a case like this that the single-pole interrupting rating must be adequate. Table 7.1.7.2 of UL 489 provides the only guidance in this area. Single-pole ratings are provided under the "Individual" columns. These are the only short-circuit tests in UL

480 that test for full voltage across one pole. Take for example, a 3-pole, 100 amp, 480 volt molded case circuit breaker. It may have a marked 3-pole interrupting rating of 42,000 amperes but its single-pole rating is only 8,660 amps. This is the one that is circled in the tabled. That's a big difference, big enough to cause a safety concern. This issue can be safely resolved by simply making people aware of the situation, by modifying Section 110-9, so that they can safely apply the devices within their tested limits.

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

PANEL ACTION: Reject.

PANEL STATEMENT: The product standard does not assign a single pole rating to a multipole circuit breaker. The table referenced, 7.1.7.2 of UL489, tabulates the minimum test current values for one of several test sequences of the program, based on the current rating of the circuit breaker. This table is not intended for the maximum short circuit rating of the circuit breaker. The submitter's substantiation describes an installation that does not comply with the requirements of 110-9.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #4007)

1- 211 - (110-9): Reject

SUBMITTER: Robert B. Alexander, Fluor Daniel

RECOMMENDATION: Add text after the first sentence to read:

The available short-circuit current shall be permitted to exceed the interrupting rating of the equipment for not more than two seconds during an automatically controlled, closed transition, power transfer.

SUBSTANTIATION: References:

Proposal 1-174 NFPA 70-A98 ROP.

Proposal 1-175 NFPA 70-A98 ROP.

Comment 1-215 NFPA 70-A98 ROC.

Comment 1-216 NFPA 70-A98 ROC.

Comment 1-217 NFPA 70-A98 ROC.

A reading of the above proposals and comments has left several users in confusion as to the intent of the Panel. Since I was an original submitter, I have been questioned several times as to the Panel's intent. Currently I recommend rating the equipment based on calculated contributions from both sources. I do not believe it is technically necessary, but I do not believe that the current wording can be interpreted otherwise.

I am personally opposed to any manual system of closed transfer; the potential to leave equipment in a dangerous condition is too great.

I take some encouragement that the Panel obviously reread my Proposal 1-175 when rejecting Comment 1-215. The Panel statement simply challenged the two-second interval, but otherwise seemed to accept it. I will attempt to justify it now. The systems that would most commonly use the proposed wording are normally-opened, automatic, secondary selective, distribution equipment. The actual interval of parallel operation during an automatically controlled transition is typically, on the order of 8-16 cycles. This is obviously considerably less than the two seconds suggested. However, the submitter is aware of a few automatic transfer switches that use molded case circuit breakers as the switching devices. The mechanical linkages that control the transfer have enough "slop" that the actual time of the closed transition is a bit less than two seconds.

As pointed out in the original proposal, the transfer itself will not precipitate a downstream fault where the danger is downstream devices being over stressed. The devices used for switching cannot actually see contributions from both sources, whereas downstream devices potentially could. The probability of the concurrent failure required to actually create a dangerous condition is infinitesimal.

Finally, as pointed out in several of the proposals and comments, these are commonly applied configurations in industrial facilities, especially continuous process ones, with a long history of success.

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

PANEL ACTION: Reject.

PANEL STATEMENT: Complex systems design criteria such as closed transition are inappropriate for specific inclusion in the NEC. Existing sections, such as 90-4 may be an appropriate avenue to deal with such issues.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 11

NEGATIVE: 1

NOT RETURNED: 1 Macias

EXPLANATION OF NEGATIVE:

FLOYD: Proposal 1-211 (Log #4007) brings attention to a design and application issue that is not adequately addressed by product standards and the NEC. Some manufacturers have addressed this performance rating in their product literature, while others have not. From a user's perspective, this proposal will help assure a safe application and installation as noted in the proposal substantiation.

(Log #664)

1- 212 - (110-10): Reject

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise penultimate sentence:

This fault shall be assumed to be either between two or more of the circuit conductors or between any <u>ungrounded</u> circuit conductor and ~~the~~ a grounding conductor(s) ~~or enclosing metal raceway.~~

SUBSTANTIATION: Editorial. A grounded circuit conductor is not normally considered for ground faults. "An enclosing metal raceway" is somewhat superfluous, as if it is grounded it will be a grounding conductor, and if ungrounded it is not pertinent to the section.

PANEL ACTION: Reject.

PANEL STATEMENT: The grounded conductor is a current carrying conductor. Deleting the reference to metal raceways may lead to a misintrepretation of this section.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #2324)

1- 213 - (110-10): Reject

SUBMITTER: Mark Ptashkin, City of Phoenix, AZ

RECOMMENDATION: Add the following underlined text to the section.

110-10. Circuit Impedance and Other Characteristics. The overcurrent protective devices, <u>conductors,</u> the total impedance, the component short-circuit current ratings, and other characteristics of the circuit to be protected shall be selected and coordinated to permit the circuit-protective devices used to clear a fault to do so without extensive damage to the electrical components of the circuit. This fault shall be assumed to be either between two or more of the circuit conductors, or between any circuit conductor and the grounding conductor or enclosing metal raceway. Listed products applied in accordance with their listing shall be considered to meet the requirements of this section.

SUBSTANTIATION: Due to the absence of the word, the conductors are often overlooked, or passed over when short circuit ratings are addressed for other portions of the circuit. In many cases, the conductors may actually be the weak link in the system, and it should be clearly shown that they must be addressed.

The addition of the word conductors in this paragraph will clearly show that they are to be considered when applying this section as well as making the code more user friendly.

PANEL ACTION: Reject.

PANEL STATEMENT: The existing requirement provides that faults be cleared without extensive damage to the electrical components of the circuit. Conductors are an electrical component of the circuit.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #1187)

1- 214 - (110-11): Reject

SUBMITTER: John A. Souza, M&M South Baldwin Electric Co.

RECOMMENDATION: Add new text:

"All surface and flush mounted non watertight switch boards, panelboards, and distribution boards shall be installed no less than 3 ft from any sink where hot water and/or potentially corrosive cleaning agents are to be used."

SUBSTANTIATION: The problem I wish to resolve is the hazardous conditions caused by rust and oxidation promoting materials that may come into contact with panel covers, dead fronts,

bussbars, overcurrent protection terminations, etc. This contact may occur due to steam from hot water or from splashing as chemical agents are poured down drain.
PANEL ACTION: Reject.
PANEL STATEMENT: Compliance with the present requirements of 110-11 would resolve the problem addressed in the substantiation.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3938)

1- 215 - (110-12(a)): Reject
Note: It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 9 for comment.
SUBMITTER: William F. Laidler, Town of Hanover, MA
RECOMMENDATION: Revise text as follows:
(a) Unused Openings. Unused openings in ~~boxes~~ enclosures, raceways, auxiliary gutters, cabinets, equipment cases, or housings shall be effectively closed to afford protection substantially equivalent to the wall of the equipment. Where metal plugs or plates are used with nonmetallic cabinets or cutout boxes, they shall be recessed at least 1/4 in. (6.35 mm) from the outer surface.
SUBSTANTIATION: Section 373-4 addresses the procedures for closing unused openings in enclosures only, I have submitted a proposal to strike that entire section and address those requirements in one place. In the interest of creating a more usable and readable code the repetition of information throughout the document should be minimized. The word enclosure in this paragraph is all inclusive and addresses various wiring methods and articles within the code.
PANEL ACTION: Reject.
PANEL STATEMENT: As defined, the term "enclosure" has a broad meaning. The panel concurs that the present wording better conveys the intent of the requirements as it already meets the intent of the submitter.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3893)

1- 216 - (110-12(b)): Reject
Note: It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 9 for information.
SUBMITTER: J. Philip Simmons, Olympia, WA
RECOMMENDATION: Delete this section and move the requirements to Section 370-52.
SUBSTANTIATION: The most significant requirements for subsurface enclosures (manholes) are located in Article 370. Locating this section in Part D of Article 370 should improve the user friendliness of the Code.
A companion proposal has been made for Section 370-52.
PANEL ACTION: Reject.
PANEL STATEMENT: The material referenced includes access to electrical equipment. The panel concludes that the present location of this subject matter best serves the NEC user by remaining in Article 110.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3673)

1- 217 - (110-12(c)): Reject
SUBMITTER: George Ferguson, Eastern Michigan Univ.
RECOMMENDATION: Add text as follows:
110-12(c) Integrity of Electrical Equipment and Connections. External moving and internal parts of electrical equipment, ...or deteriorated by corrosion, chemical action, or overheating. This includes devices, cover plates, hinges, and hardware for enclosure doors. This rule shall apply to those performing or causing the performance the damage or painting of the equipment.
SUBSTANTIATION: There is a great deal of damage and expense occurring because of layers of paint applied to devices, covers, hinges, locks, and other moving parts of electrical equipment. There has been a lot of disagreement between the building owners, electrical inspectors, and electrical contractors of the cost and conditions to remedy this condition. The added wording will help to access responsibility to those responsible and perhaps reduce the problem in the future.
PANEL ACTION: Reject.
PANEL STATEMENT: The problem described in the substantiation is adequately addressed in the second sentence of 110-12(c).
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2048)

1- 218 - (110-12(e) (New)): Accept in Principle
SUBMITTER: Joel A. Rencsok, Scottsdale, AZ
RECOMMENDATION: Add a new section to read as follows:
(e) Terminations. Terminations for all electrical connections to devices and equipment shall be torqued as required by the manufacture of such electrical device or equipment.
SUBSTANTIATION: Terminations are not being installed as required by the manufacture and only LISTED electrical devices and equipment require the torquing of terminations of current carrying conductors be shown on the enclosure of electrical equipment.
Adding this section will require all equipment be supplied with the torquing requirements.
PANEL ACTION: Accept in Principle.
Add a new section to read as follows:
"(d) Terminations. Terminations for electrical connections to devices and equipment shall be torqued as required by the manufacturer of the electrical device or equipment."
PANEL STATEMENT: The panel does not necessarily agree with the submitter's substantiation.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 11
NEGATIVE: 1
NOT RETURNED: 1 Macias
EXPLANATION OF NEGATIVE:
MINICK: Section 110-3(b) currently instructs users to follow all manufacturer instructions included in the listing and labeling of listed and labeled equipment. The intent of the submitter is presently addressed in Section 110-14 and the Fine Print Note. This additional wording is redundant.

(Log #2049)

1- 219 - (110-12(f) (New)): Reject
SUBMITTER: Joel A. Rencsok, Scottsdale, AZ
RECOMMENDATION: Add a new section to read as follows:
(f) Seismic Zones. Electrical equipment located in Seismic Zones 2,3, and 4, shall be supported to resist the forces that can be imposed. Supporting requirements shall be designed by a structural engineer and detail drawings shall be available to the authority having jurisdiction.
SUBSTANTIATION: Electrical equipment is presently being installed in areas of seismic zones 2,3, and 4 without this requirement in the codes.
The NEC should require this. The building codes do not adequately cover systems such as electrical.
Electrical systems are the main backbone of any building to allow the people to have time to exit the structure.
Presently installed electrical systems disregard the seismic loads imposed on the electrical installation.
History has shown the number of failures and this section will correct this oversight.
PANEL ACTION: Reject.
PANEL STATEMENT: This is a design issue and is best left to the building structural requirements as imposed through the building codes or other appropriate standards. No technical substantiation was submitted to support the recommendation.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #1458)

1- 220 - (110-13): Reject
SUBMITTER: Joseph E. McCann, City of Coral Springs, FL
RECOMMENDATION: Add new text to read as follows:
Electrical equipment mounted overhead (such as transformers suspended on all thread) should be fastened by approved means other than lead shields or anchors.
SUBSTANTIATION: The use of lead shields overhead to mount heavy electrical equipment should be eliminated due to the low melting point of lead 650°. Equipment could fall on to a firefighter while fighting fires.
PANEL ACTION: Reject.
PANEL STATEMENT: Substantiation is insufficient to prohibit the general use of the referenced devices for all overhead electrical installations.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #1678)

1- 221 - (110-13(a)): Reject
SUBMITTER: Terry L. Carlson, Nebraska State Electrical Board
RECOMMENDATION: Add new sentence after first sentence in current text to read as follows:
(a) Electrical equipment likely to require maintenance or servicing shall be mounted at such height and location as to allow safe working access for those persons servicing the equipment.
SUBSTANTIATION: Inspectors find equipment enclosures, fuse disconnects, and circuit breaker enclosures mounted so low to the floor or finished grade that they must get down on their knees or lower in order to inspect them. Anyone who tries to service the equipment after the installation also must lay down in many cases to work on the equipment. This proposal will require the installation to allow safe working access.
PANEL ACTION: Reject.
PANEL STATEMENT: Section 110-26 requires sufficient space and access for safe operation and maintenance of the equipment. A code rule such as this would be too restrictive for such items as switchgear, motor control centers, unit substations, etc.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #1048)

1- 222 - (110-14): Accept
SUBMITTER: James M. Daly, BICC General
RECOMMENDATION: Revise 110-14 as follows:
110-14(a) - change "No. 10" to "10 AWG".
110-14(c)(1) - change "Nos. 14 through 1 conductors" to "14 through 1 AWG conductors".
110-14(c)(2) - change "No. 1" to "1 AWG".
SUBSTANTIATION: To provide consistency throughout the Code. The term "No." is not used in any of the Tables in Chapter 3.
AWG and kcmil are trade size designators specifically authorized for use with the SI system of units in North America. Also, industry practice is to use AWG or kcmil only.
This is one of a series of proposals to make this change throughout the Code.
PANEL ACTION: Accept.
PANEL STATEMENT: The panel has no knowledge of the specific agreement that "AWG and kcmil are trade size designators specifically authorized for use with the SI system of units in North America."
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2505)

1- 223 - (110-14): Reject
SUBMITTER: Gary R. DeLay, Franktown, CO
RECOMMENDATION: Add Table 1.3 Tightening Torques for Screws in Pound-Inches, found in NEC 1999 Handbook under Section 110-14, to the NEC 1999 Code Book. Add table immediately after Section 110-14 or add to the table section of the code book.
SUBSTANTIATION: That information is not readily available on the job site. We have the code book but not the handbook.
PANEL ACTION: Reject.
PANEL STATEMENT: The NEC Handbook commentary states, "[this table] ... should be used for guidance only where no tightening information on the specific wire connector is available. It should not be used to replace manufacturer's instructions, which should always be followed." See panel action and statement on Proposal 1-218
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2425)

1- 224 - (110-14(a)): Reject
SUBMITTER: Dennis Kaunzner, City of Sierra-Vista, AZ
RECOMMENDATION: Add a new last sentence to read:
"There shall only be one terminal on a stud post."
SUBSTANTIATION: Instead of using 2, 3, and 4 lug terminals on a single stud post, electricians are using a combination of terminals which result in poor connections, improper surface contact.
PANEL ACTION: Reject.
PANEL STATEMENT: This requirement is too restrictive and may prohibit existing listed products. Many single lug products are presently listed for grouping on a single stud where described in the manufacturers instructions. The present Code requirements prohibit multiple lugs for terminations unless specifically identified for such use.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4156)

1- 225 - (110-14(a)): Reject
SUBMITTER: Frederic P. Hartwell, Hartwell Electrical Services, Inc./Rep. Massachusetts Electrical Code Advisory Committee
RECOMMENDATION: Revise as follows:
(a) Terminals. Connection of conductors to terminal parts shall ensure a thoroughly good connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for No. 10 or smaller solid conductors. Where stranded conductors are terminated on and not looped through such terminals, the terminals shall be identified for such use, or the strands at the terminals shall be made solid.
Terminals for more than one conductor and terminals used to connect aluminum shall be so identified.
SUBSTANTIATION: Surprisingly, it isn't a violation of any listing requirement to used side-wired devices with stranded wire. Normally such devices are used without problems for residential applications with solid wire, but nothing restricts them to such applications. Present product standards don't adequately address the near impossibility of back-wrapping 19-stranded conductors under a screw head, especially on lower quality devices. Take receptacles, for example. At present UL 498 appears to have no testing protocol to adequately assure the containment of stranded wires on binding screw lugs. Paragraph 12.5 simply parrots the present NEC rule under discussion here. Conductors looping through devices are okay because insulation on both sides of the skinned section of wire contains the strands. If necessary, a little work with a soldering tool quickly makes a solid conductor out of a stranded one.
The Panel action in the previous cycle rejecting this language is out of touch with the everyday experience of journeyman electricians. A number of highly qualified individuals have discussed the problem with the standard privately, pointing to the issue of stranding characteristics. They were referring to the fact that the standard was drawn at a time when the stranded conductors typically used with these devices, if stranded wire were ever actually used, would be 7-strand instead of today's 19-strand conductors, which makes the problem even worse today.
The proposal is a properly worded, common sense approach to a real enforcement headache. It will not impose any significant costs on the industry, due to the use of the word "identified." That is intentionally different from "listing;" it allows general recognition in

manufacturer's catalogs which is generally already indicated as a marketing advantage. Over time, UL can phase in a minor revision to the standard with minimal disruption. The wording has been working well in Massachusetts, where it has been in force as code for several cycles.

Finally, to respond to NEMA Comment 1-237, on which the Panel based its final rejection in the 1999 cycle, the NEC contains many product design requirements. There's a good reason for this. The NFPA process is an open, consensus based one, and the UL process is not; UL always agrees that its process is, most emphatically, not a consensus one. Therefore many times the NEC has been used to force a change in a product standard. No apologies offered on that score.

The other issue raised in the NEMA comment had to do with solder and cold flow. This strains the boundaries of common sense. The idea that a stranded conductor with its strands tinned could make a less reliable connection than the same conductor with those same strands free to move around under a screw, however well they may have been twisted, is frankly unbelievable. Should credible substantiation emerge on this point, then the Panel could simply remove the allowance for solder. More to the point, however, is that upon the adoption of this proposal, UL will revise the product standard to provide meaningful termination requirements for these conductors.

PANEL ACTION: Reject.

PANEL STATEMENT: The proposal addresses product design requirements and is not appropriate for an installation Code. Provisions that allow field alteration of a listed or unlisted manufactured wiring product with unknown non-standardized materials is not appropriate. The substantiation does not include specific identification of field problems.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #1497)

1- 226 - (110-14(c)): Reject

SUBMITTER: Bill Whitlow, Lockwood Greene

RECOMMENDATION: Revise text as follows:

(c) Temperature Limitations. The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device. ~~Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both.~~ Ampacity adjustment and correction shall not be applied in determining conductor ampacity for complying with the termination temperature rating.

FPN: The operating temperature of a conductor in conduit or cable may exceed the temperature rating of the termination to which the same conductor is connected.

SUBSTANTIATION: The second sentence, "Conductors...shall be...used for...adjustment..." is grammatically incorrect and is confusing. The added text more clearly expresses the intent that the ampacity for terminations is to be calculated separately and independent from the ampacity for wire in conduit.

PANEL ACTION: Reject.

PANEL STATEMENT: The Submitter is incorrect in his belief that "ampacity adjustment and correction" shall not be applied in determining conductor ampacity for complying with the termination temperature rating.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #3285)

1- 227 - (110-14(c)): Accept

SUBMITTER: James T. Pauley, Square D Co.

RECOMMENDATION: Revise NEC 110-14(c) with the additions (underlined) and deletions (strike through) as shown. The entire text of 110-14(c) is shown for clarity, but only those changes shown underlined or strike through are part of this proposal.

(c) Temperature Limitations. The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device. Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both.

(1) Equipment Provisions. The determination of termination provisions of equipment shall be based on (a) or (b). Unless the equipment is listed and marked otherwise, conductor ampacities used in determining equipment termination provisions shall be based on Table 310-16 as appropriately modified by 310-15(b)(1) through (7).

~~(1)~~ (a) Termination provisions of equipment for circuits rated 100 amperes or less, or marked for Nos. 14 through 1 conductors, shall be used only for one of the following.

~~a.~~(1) Conductors rated 60°C (140°F), or

~~b.~~(2) Conductors with higher temperature ratings, provided the ampacity of such conductors is determined based on the 60°C (140°F) ampacity of the conductor size used, or

~~c.~~(3) Conductors with higher temperature ratings if the equipment is listed and identified for use with such conductors, or

~~d.~~(4) For motors marked with design letters B, C, D, or E, conductors having an insulation rating of 75°C (167°F) or higher shall be permitted to be used provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity.

~~(2)~~ (b) Termination provisions of equipment for circuits rated over 100 amperes, or marked for conductors larger than No. 1, shall be used only for

~~a.~~(1) Conductors rated 75°C (167°F), or

~~b.~~(2) Conductors with higher temperature ratings provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity of the conductor size used, or up to their ampacity if the equipment is listed and identified for use with such conductors.

(2) Separate Connector Provisions. ~~(3)~~ Separately installed pressure connectors shall be used with conductors at the ampacities not exceeding the ampacity at the listed and identified temperature rating of the connector.

FPN: With respect to Sections 110-14(c)(1), and (2), ~~and (3),~~ equipment markings or listing information may additionally restrict the sizing and temperature ratings of connected conductors.

SUBSTANTIATION: The objective of this proposal is to clear up confusion relative to what ampacities are used to determine the proper conductor size at equipment terminations. When 600V and less equipment is evaluated relative to the appropriate temperature characteristics of the terminations, conductors sized based on Table 310-16 are used. The UL General Information Directory (pages 1 and 2) clearly indicates that the 60C and 75C provisions for equipment have been determined using conductors from Table 310-16. However, if an installer or designer is not aware of the UL guide card information, they may attempt to select conductors based on the Tables other than 310-16. This is especially true if a wiring method is used that allows the use of ampacities such as those in 310-17. This can result in overheated terminations at the equipment. Clearly, the ampacities shown in other tables (such as 310-17) could be used for various conditions that the wiring method is subject to (ambient, ampacity correction, etc.), but the conductor size at the termination must be based on ampacities from Table 310-16.

This proposal does not have any new impact on the equipment or the wiring methods; it simply adds a rule from the listing information into the Code because it is an installation and equipment selection issue.

In addition the proposal provides for a slight renumbering to easily accommodate the reference to the Table and adds titles to the Level 2 subdivision as required by the NEC Style Manual.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #2245)

1- 228 - (110-14(c)(1)): Accept in Principle

SUBMITTER: Steven R. Musial, II, Pittsburgh, PA

RECOMMENDATION: Revise text as follows:

110-14(c)(1) "Termination provisions of equipment for circuits rated 100 amperes or less (after the application of all derating factors), or marked...".

SUBSTANTIATION: It is easy to select the wrong temperature column in Table 310-16 if derating factors are not applied, such as, 1.25 for continuous loads, 0.8 for 4, 5, or 6 current carrying conductors in a conduit or derating for higher than 30°C ambient temperatures.

PANEL ACTION: Accept in Principle.

PANEL STATEMENT: The panel believes that the action on Proposal 1-227 meets the intent of the submitter.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #665)

1- 229 - (110-14(c)(1)(b); (2)(b); (3)): Reject
SUBMITTER: Dan Leaf, Palmdale, CA
RECOMMENDATION: Revise to read as follows:
(1)(b) Conductors with higher temperature ratings, provided the ampacity of such conductors is determined based on the 60°C (140°F) ampacity of the conductor ~~size used~~ for a conductor length not less than 6 ft (1.83 m) from the equipment termination provisions, or
(2)(b) Conductors with higher temperature ratings provided the ampacities of such conductors does not exceed the 75°C (167°F) ampacity of the conductor size used, for a conductor length not less than 6 ft (1.83 m) from the equipment terminations, or up to their ampacity if the equipment is listed and identified for use with such conductors.
(3) Separately installed pressure connectors shall be ~~used with conductors at the ampacities not exceeding the ampacity at the listed and identified temperature rating of the connector~~ listed for use with the number, size, and material of the conductor used and in accordance with their temperature and voltage rating.
FPN: No change.
SUBSTANTIATION: The provisions of this section appear to require the entire length of conductor comply with the ampacity/temperature requirements, whereby higher ampacity/temperature rated conductors cannot be utilized except for correction/adjustment factors. This in effect, does not allow for higher rated ampacities to be used for any part of the circuit far removed from equipment terminations. Prior to inclusion of these requirements in the Code to comply with listing requirements (Section 110-3(b)) some jurisdictions would permit a splice at some distance from the equipment terminations to conductors sized for higher ampacities at their rated temperature, which can result in a smaller size conductor for portions of a circuit. This is economically advantageous and does not negate the reasons for the requirements if the splicing devices are suitably rated.
The proposed 6 ft is arbitrary; if the panel believes the basic premise of the proposal has merit that figure could be adjusted.
Sections 310-15(b)(2) Exception No. 4 and 310-60(b)(1) Exception provide for different ampacity ratings for portions of circuits.
The proposal for (3) is intended for clarity and inclusion of other factors.
PANEL ACTION: Reject.
PANEL STATEMENT: The substantiation does not support the recommendation.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #531)

1- 230 - (110-14(c)(1)d): Reject
SUBMITTER: Charles B. Schram, Wilmette, IL
RECOMMENDATION: Revise Section 110-14(c)(1)d by adding "(1)" after the word "provided" in the third line, and by adding the following at the end of the sentence:
"and (2) the terminations for such conductors at the controller meet the provisions of Section 110-14(c)(1)(c)."
SUBSTANTIATION: The substantiation for Comment No. 1-248 in the 1998 NEC ROC referred to "the vast majority of motor control devices" as being suitable for connection of conductors selected on the basis of either 60 Deg. C or 75 Deg. C ampacities. However, this does not include all such devices. There is nothing to prevent listing of motor control devices that do not meet the condition of Section 110-14(c)(1)(c), other than revising the several product safety standards for such devices to force compliance at some time in the future. The proposal is intended only to close the "loophole" provided by the present wording of Section 110-14(c)(1)(d), without necessitating revisions of several product safety standards.
PANEL ACTION: Reject.
PANEL STATEMENT: The proposed language is redundant to 110-14(c)(1)(c).
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3845)

1- 231 - (110-14(c)(1)(d)): Reject
Note: It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 11 for information.
SUBMITTER: Terry O'Reilly, Riviera Electric
RECOMMENDATION: Revise text to read as follows:
(d) For motors marked with design letter B, C, D, or E, conductors having an insulation rating of 75°C (167°F) or higher shall be permitted to be used provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity.
SUBSTANTIATION: For clarity of application this paragraph should also be in Part B of Article 430 or at least to refer you back to Article 110-14(c)(1)(d).
PANEL ACTION: Reject.
PANEL STATEMENT: The proposed text is virtually identical to the present text of 110-14(c)(1)(d). The substantiation indicates the text should also be included in Article 430 Part B. Refer to CMP-11 for information.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2246)

1- 232 - (110-14(c)(2)): Accept in Principle
SUBMITTER: Steven R. Musial, II, Pittsburgh, PA
RECOMMENDATION: Revise text as follows:
110-14(c)(2) "Termination provisions of equipment for circuits rated over 100 amperes or less (after the application of all derating factors), or marked...".
SUBSTANTIATION: It is easy to select the wrong temperature column in Table 310-16 if derating factors are not applied, such as, 1.25 for continuous loads, 0.8 for 4, 5, or 6 current carrying conductors in a conduit or derating for higher than 30°C ambient temperatures.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel believes that the action on Proposal 1-227 meets the intent of the submitter.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #1499)

1- 233 - (110-15 (New)): Accept in Principle
Note: It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panels 2, 4, and 9 for comment.
SUBMITTER: Larry D. Wendt, State of Idaho/Rep. I.A.E.I.
RECOMMENDATION: Add the following text:
110-15. High-Leg Marking. On a 4-wire, delta-connected system where the midpoint of one phase winding is grounded to supply lighting and similar loads, the conductor or busbar having the higher phase voltage to ground shall be durably and permanently marked by an outer finish that is orange in color, or by other effective means. Such identification shall be placed at each point on the system where a connection is made if the grounded conductor is also present. On switchboards or panelboards, the "B" phase shall be that phase having the higher voltage to ground. See Section 384-3(f) for phase arrangement of busbars. Other busbar arrangements shall be permitted for additions to existing installations and shall be marked.
Exception: Equipment within the same single section or multisection switchboard or panelboard as the meter on 3-phase, 4-wire, delta-connected systems shall be permitted to have the same configuration as the metering equipment.
SUBSTANTIATION: High-leg marking is a requirement that should be in Section 110 where it would apply to all types of installations instead of to services, feeders, and switchboards and panelboards. The new Section 110-15 will meet the intent of the Code and also simplify it. Please coordinate with the proposals on Sections 210-4(d), 215-8, 230-56, 384-3(e), and 384-3(f).
PANEL ACTION: Accept in Part.

Accept the first two sentences of the proposal to read as follows:
"110-15. High-Leg Marking. On a 4-wire, delta-connected system where the midpoint of one phase winding is grounded to supply lighting and similar loads, the conductor or busbar having the higher phase voltage to ground shall be durably and permanently marked by an outer finish that is orange in color, or by other effective means. Such identification shall be placed at each point on the system where a connection is made if the grounded conductor is also present."
Reject the balance of the proposal.
PANEL STATEMENT: That part of the proposal after sentence two, including the exception is rejected because it does not address high-leg marking, relates only to switchboard and panelboard configuration, and should continue to be addressed in 384-3(f). Refer to CMP-2, CMP-4, and CMP-9 for comment.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #1743)

1- 234 - (110-15 (New)): Reject
SUBMITTER: Jamie McNamara, Hastings, MN
RECOMMENDATION: New text.
110-15 Razor Sharp Edges. Electrical equipment shall be designed installed and maintained that users, installers and maintenance personnel will not be likely to come into contact with razor sharp edges.
SUBSTANTIATION: Some equipment is manufactured or modified in the field that the installer or users of the equipment come into contact with razor sharp edges. Often cutting there fingers or hands. Some examples are punched or cut enclosures and knockouts that leave a razor sharp edge near the front of the enclosure that one has to reach over or by to work on or in the equipment. Please see similar proposal to 373-10 (d).
PANEL ACTION: Reject.
PANEL STATEMENT: The proposal does not address an electrical hazard and is not consistent with the stated purpose of the Code in Section 90-1(a).
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2563)

1- 235 - (110-15 (New)): Accept in Principle
NOTE: The Technical Correlating Committee directs the panel to change "residential" to "dwelling" to comply with current word usage. In addition, the Technical Correlating Committee directs the panel to use the proper metrication in the text. This action will be considered by the Panel as a Public Comment.
SUBMITTER: Ray A. Jones, Electrical Safety Consulting Services, Inc. (ESCS, Inc.)
RECOMMENDATION: Add the following new section:
110-15. Flash Protection. For other than residential occupancies, switchboards, panelboards, loadcenters and motor control centers shall be marked in the field to indicate the incident energy in calories per square centimeter for a worker at a distance of 18 in.
SUBSTANTIATION: Significant number of electricians are being seriously burned and often killed from an accidental electrical flash while working equipment "hot." Most of these serious accidents can be eliminated or significantly reduced if the electricians wear the proper type of protective clothing. If switchboards, panelboards, loadcenters, and motor control centers were individually marked with the incident energy, the personnel would easily know what type of protective clothing to wear, because its rating is based upon the available incident energy in calories per square centimeter. These calculations can easily be made by an engineer or a knowledgeable contractor by using a formula which was presented in an IEEE paper by R.L. Doughty, T.E. Neal, and H.L. Floyd II, "Predicting Incident Energy to Better Manage the Electric Arc Hazard on 600 V Power Distribution Systems", Record of Conference Papers IEEE IAS 45th Annual Petroleum and Chemical Industry Conference, September 28-30, 1998. This formula also appears in the 2000 edition of NFPA 70E, Electrical Safety Requirements for Employee Workplaces. The formula is $E_{MB} = 1038.7 D_B^{1.4738} t_A [0.0093F^2 - 0.3453F + 5.9675]$
Where E_{MB} = incident energy from a box in cal/cm^2
D_E = Distance from arc in inches. Assume 18 inches for this calculation.
t_A = Arc duration in seconds
F = Bolted fault short circuit current
These requirements do not include residential occupancies because the available short circuit current is generally low enough so as not to be of a major concern.
PANEL ACTION: Accept in Principle.
Add the following new section:
"110-16. Flash Protection. Switchboards, panelboards, and motor control centers installed in other than residential occupancies shall be marked in the field to indicate the incident energy in calories per square centimeter for a worker at a distance of 18 in.
FPN: See NFPA 70E-2000, Electrical Safety Requirements for Employee Workplaces for calculation methods and charts related to incident energy."
PANEL STATEMENT: The term "loadcenter" was removed since it it did not appear in Article 384. The FPN was added to give further direction to the user. The panel concludes the revised proposal meets the intent of the submitter.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 11
NEGATIVE: 1
NOT RETURNED: 1 Macias
EXPLANATION OF NEGATIVE:
MINICK: The requirement is not enforceable and will not improve electrical safety. The three published methods of calculating incident energy result in considerably different values. This would create a dilemma for the authority having jurisdiction in trying to enforce some specific value. In addition, the FPN refers to NFPA 70E-2000 for calculation methods. NFPA 70E-2000 only contains one reference on how to perform the calculation of incident energy and this is a non-enforceable (informative) annex. The NFPA 70E committee specifically placed this material in an informative annex because of the variation in calculation methods. Furthermore, the incident energy value has little meaning to the electrical worker.
Process industries, such as pharmaceuticals, typically must work on "hot" equipment. This is recognized as a serious problem, but the proposed solution does not provide a suitable answer. The NFPA 70E committee is addressing this problem and it would be better to wait for the experts in this area to devise a solution that can be added to NFPA 70E, rather than the more general NEC.
COMMENT ON AFFIRMATIVE:
ANTHONY: Acceptance of this proposal is a bold stroke on behalf of electrician safety. It could be a very costly addition to the NEC, however, if it raises engineering costs for building owners. Applying this proposal could be as simple as computing short circuit at the service entrance and using it as the maximum fault current at all panels throughout the building. On this basis, protective gear for electricians could be selected.
Applying this proposal could also get much more complicated if investigations into comparative arc duration times of protective devices need to be investigated. Fault current distribution profiles may need to be determined in very large buildings. It also favors protective devices that open circuits based upon rate of change in current; namely, fuses. Thus, the proposal has the potential for being quite controversial in many quarters of the industry. Nevertheless, at this stage in the code-making process, it is better to err on the side of safety. I hope for lively and engaging debate on this subject in the ROC stage of 2002 NEC.

(Log #315)

1- 236 - (110-18): Reject
SUBMITTER: Charles J. McKnight, Indianapolis, IN
RECOMMENDATION: Add the following text to 110-18:
These parts shall be marked as to the hazard and these markings shall be of sufficient durability to withstand the environment involved.
SUBSTANTIATION: This will help to readily identify hazards and help to prevent possible injuries.
PANEL ACTION: Reject.
PANEL STATEMENT: The determination that arcing parts exist can be made without the need for marking all such equipment.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #6)

1- 237 - (110-22): Accept in Principle

Note: It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 10 for comment.

NOTE: The following proposal consists of Comment 1-281 on Proposal 1-268 in the 1998 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 1999 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 1-268 was:

Revise the 2nd paragraph as follows:

"Where circuit breakers or fuses are applied in ~~compliance with~~ series combination ratings ~~marked on the equipment by the manufacturer~~, the equipment enclosure(s) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating."

SUBMITTER: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

RECOMMENDATION: The proposal should be accepted in principle. Revise the first sentence of the second paragraph of that section to read as follows:

"Where circuit breakers or fuses are applied in ~~compliance with~~ series combination ratings ~~marked on the equipment by the manufacturer~~, or otherwise in compliance with the provisions of Section 240-83(c), the equipment enclosure(s) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating."

SUBSTANTIATION: This comment is a companion to one made on Proposal 10-110 which did indeed make the change cited by the proposal submitter. CMP 1 must now correlate these two provisions. This comment should be accepted provisionally based on continued CMP 10 acceptance of the other proposal in some form, as now seems likely. This wording allows correlation between the two sections without needing to know in exactly what form the revision in Section 240-83(c) emerges, which we can't really tell at this point. My companion comment suggests a more restrictive form, and the split panel vote and Correlating Committee note suggests that this is a work in progress.

PANEL ACTION: Accept in Principle.

Revise the first sentence of the second paragraph to read as follows:

"Where circuit breakers or fuses are applied in compliance with the provisions of Section 240-86 for series combination ratings, the equipment enclosure(s) shall be legibly marked at each piece of equipment to indicate the equipment has been applied with a series combination rating."

Remove the FPN.

PANEL STATEMENT: The panel concludes that this revised wording meets the intent of the submitter. Refer to CMP-10 for comment.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #667)

1- 238 - (110-22): Accept in Principle

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

Identification of Disconnecting Means. Each disconnecting means ~~required by this Code~~ for motors and appliances, and each service, feeder, or branch circuit ~~at the point where it originates~~ shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident.

(remainder unchanged)

SUBSTANTIATION: The syntax does not make this rule clear. The heading refers to disconnecting means but "at the point where it originates" appears to refer to the service, feeder, or branch circuit supply connection point. For services, and conductors installed under tap rules the disconnect will not usually be at the originating point of the circuit and may be a substantial distance away. For example Section 240-21(b)(5) permits unlimited tap length on the supply side of the disconnecting means. Identification of the disconnect is a higher safety priority than the originating point of the circuit. Identification of disconnects which are not required by the Code is just as important as they perform the same function and many times are the most accessible and operated devices. The unintended operation of a disconnecting means due to lack of identification can have serious consequences.

PANEL ACTION: Accept in Principle.

Revise the first paragrah to read as follows:

"110-22. Identification of Disconnecting Means. Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. The marking shall be of sufficient durability to withstand the environment involved."

The remainder of this section is addressed in the panel actions of Proposals 1-237 and 1-241.

PANEL STATEMENT: The panel concludes that the revised wording satisfies the concerns of the submitter.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #2325)

1- 239 - (110-22): Accept in Principle

SUBMITTER: Mark Ptashkin, City of Phoenix, AZ

RECOMMENDATION: New text to be added is underlined.

"Where circuit breakers or fuses are applied in compliance with the series combination ratings marked on the equipment by the manufacturer, the equipment enclosure(s) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. This marking shall be required at each piece of equipment that is part of a series combination system. The marking shall be readily visible and state the following:"

SUBSTANTIATION: The intent of this proposal is to clearly require that a label or other suitable means must be applied at all equipment that is part of a series rated system. For example it a 65/10 series rated system is installed (65 k upstream device, 10 k downstream device) a label indicating that it is part of a series rated system must be applied at both locations. If it is part of a "3 tier" system a label is required at all 3 locations. This will clarify that all pieces of a series rated system should be clearly marked so that any individual replacing or repairing devices or equipment is notified that they must use identified replacement components.

PANEL ACTION: Accept in Principle.

PANEL STATEMENT: The panel believes that the action on Proposal 1-237 meets the intent of the submitter.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #2884)

1- 240 - (110-22): Accept in Principle

SUBMITTER: George J. Ockuly, Cooper Bussmann

RECOMMENDATION: Delete the words "by the manufacturer" from the first sentence of the second paragraph.

SUBSTANTIATION: This change to the text is required to correlate with my proposal for 240-86. Marking by the manufacturer may not be possible for older systems that may be perfectly usable when properly protected by current-limiting devices. For example, some manufacturers of switchgear are no longer in business, but their equipment is still perfectly usable.

PANEL ACTION: Accept in Principle.

PANEL STATEMENT: The panel believes that the action on Proposal 1-237 meets the intent of the submitter.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #3257)

1- 241 - (110-22): Reject

SUBMITTER: Alan Manche, Square D Co.

RECOMMENDATION: Revise the second paragraph of 110-22 with the addition (underlined) as shown. The entire text is shown for clarity, but only those changes shown underlined are part of this proposal.

Where circuit breakers or fuses are applied in compliance with the series combination ratings marked on the equipment by the manufacturer, the equipment enclosure(s) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall be readily visible and state the following or equivalent:

CAUTION - SERIES COMBINATION SYSTEM
RATED ____ AMPERES. IDENTIFIED
REPLACEMENT COMPONENTS REQUIRED.

SUBSTANTIATION: The explicit nature of the present wording is causing field problems in the acceptance of appropriate warning signs or markings. The ANSI Z535 series of standards provides the proper procedure in establishing a hazard sign or marking. ANSI Z535.4 provides the information about what should be contained in a hazard sign or label. This includes a message panel that identifies the hazard, indicates how to avoid the hazard and advises the probable consequence of not avoiding the hazard.

The objective of the NEC wording is to generally convey the basic message requirement to user. However, in order to comply with Z535.4, the exact words stated in the NEC may not be appropriate for the contemplated circumstances. Revising the text to allow "or equivalent" would allow a hazard sign to comply with the NEC, but be formated in accordance with Z535.4.

PANEL ACTION: Reject.

PANEL STATEMENT: The term "equivalent" is vague, subjective and can lead to misleading words intended to identify a possible hazard. Refer to the new NEC Style Manual, Section 3.2.1.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #2213)

1- 242 - (110-23 (New)): Reject

SUBMITTER: Ravindra H. Ganatra, Alcan Cable

RECOMMENDATION: Add the following new text in the General Section of Article 110:

110-23. Flame or fire tests. Where not a part of a flame or fire tested cable assembly, or not installed in metallic raceways, or not installed in a flame or fire tested nonmetallic raceways, individual conductors where required shall meet applicable flame or fire test. Additionally, wire and cable products shall meet applicable requirements in following applications:

(1) Cables installed in construction Types III, IV, and V. Cables installed in Types III, IV, and V constructions shall meet a vertical flame test.

FPN No. 1: Building construction types are defined in NFPA 220 - 1998, Standard on Types of Building Construction, or the applicable building code, or both.

FPN No. 2: Vertical flame test is defined in UL 1581 - 1997, Reference Standard for Electrical Wires, Cables, and Flexible Cords. Products such as Types NM, SE, UF, etc. meet the requirements of this test.

(2) Cables installed in construction Types I and II; in cable trays; and in ducts, plenums, and other spaces not used to transport environmental air. Cables utilized in a construction Types I and II, in cable trays, and in ducts, plenums, and other spaces not used to transport environmental air shall meet a vertical tray flame test.

FPN No. 1: Building construction types are defined in NFPA 220 - 1998, Standard on Types of Building Construction, or the applicable building code, or both.

FPN No. 2: Vertical tray flame test is defined in UL 1685 - 1997, Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. Products such as Types AC, TC, MC, etc. meet the requirements of vertical tray flame test in this standard. Products marked for "limited smoke" meet the requirements of vertical tray flame test and smoke-release measurements in this standard.

(3) Cables installed vertically in shafts. Cables installed vertically in shafts shall meet a large-scale fire test for riser cables.

FPN: Large-scale fire test for riser cables is defined in UL 1666 - 1997, Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts. Types CL3R and CL2R, shown in Table 725-61, are examples of riser cables that meet the requirements of this test.

(4) Cables installed in ducts, plenums, and other spaces used to transport environmental air. Cables installed in ducts, plenums, and other spaces used to transport environmental air without the cables being enclosed in raceways in those spaces shall be capable of meeting a large-scale fire test for plenum cables.

FPN: Large-scale fire test for riser cables is defined in UL 910 - 1998, Test for Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables used in Spaces Transporting Environmental Air. Types CL3P and CL2P, shown in Table 725-61, are examples of plenum cables that meet the requirements of this test.

SUBSTANTIATION: [Note: The phrases "flame-retardant" (or "flame retardant") and "flame resistant" appear in 22 and 3 locations, respectively, in this Code. This is a general proposal that provides a basis to replace the phrases "flame-retardant" (or "flame retardant") and "flame resistant" by a phrase "flame tested" throughout the Code.]

Specific requirements applicable for a given product's performance when subjected to the required flame test are addressed in the product standard applicable for that product. The NEC does not define "flame-retardant" (or "flame retardant") because the performance requirements vary by product. One may suggest that the present use of the term "flame-retardant" is not measurable and therefore implies a false sense of security. Use of phrase "flame tested" or "fire tested" informs the user that the product shall be tested against the requirements for a specific flame test or fire test and directs the user's attention to seek further understanding about the given product's performance.

This proposal reflects the current relationship between the requirements in the Code and the applicable product standards for wire and cable products that are recognized in the Code. It is proposed to add this section in the general section of this article because the requirements for flame or fire test can be either product specific, or construction specific, or application specific. For example, flame test requirements for types of conductors recognized in Table 310-13 is covered in the applicable product standards for each type. Construction specific requirements can match the flame test performance requirement with type of building construction. Application specific requirements for installations in vertical risers and plenum spaces used for environmental air require products that can meet the applicable fire tests for their suitability in such applications.

Also, requirements for flame or fire tests for other products, where required, can be added in this section in the future.

Insulation and jacketing materials used with conductors and cables are required to provide necessary electrical, mechanical and flame or fire test performance in accordance with the requirements of the Code and the applicable product standards. In general, any improvement in one of these properties comes at the expense of the other two properties. This recommendation may facilitate harmonization of codes and standards. Also, it can promote development of cables that can deliver improved performance in all three properties whereby the insulation on conductor provides improved electrical and mechanical performance along with needed flame test performance. The overall assembly, on the other hand, can be designed and manufactured such that it provides improved mechanical and flame or fire test performance along with needed electrical performance. The overall product may have less smoke and less toxicity than products used today, which is a desirable goal.

Referencing of other NFPA standards and the test standards in the Fine Print Notes is in accordance with the latest editions of the NFPA Manual of Style and NEC Style Manual.

PANEL ACTION: Reject.

PANEL STATEMENT: The term "flame retardant" is used throughout the Code as a means of expressing to the user that the cables resist the spread of flames, albeit the test methods are often not defined. The term "flame tested" would be similarly undefined but can be understood to mean a test which does not necessarily measure the ability of a cable to resist the spread of flame-propagation (which is implied by "retardant"). Propagation is of paramount importance for conductors and cables. The Fine Print Notes in the proposal are not accurate in all cases in reflecting the flame test requirements in the product standards. Some articles of the NEC offer suggestions for the tests appropriate for the required level of flame retardance. Other articles rely on the product standards to provide such information. The panel suggests that specific proposals be made wherever the generic reference to "flame retardant" is not sufficient.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #2213a)

6- 3 - (110-23 (New)): Reject

SUBMITTER: Ravindra H. Ganatra, Alcan Cable

RECOMMENDATION: Add the following new text in the General Section of Article 110:

110-23. Flame or fire tests. Where not a part of a flame or fire tested cable assembly, or not installed in metallic raceways, or not installed in a flame or fire tested nonmetallic raceways, individual conductors where required shall meet applicable flame or fire test. Additionally, wire and cable products shall meet applicable requirements in following applications:

(1) Cables installed in construction Types III, IV, and V. Cables installed in Types III, IV, and V constructions shall meet a vertical flame test.

FPN No. 1: Building construction types are defined in NFPA 220 - 1998, Standard on Types of Building Construction, or the applicable building code, or both.
FPN No. 2: Vertical flame test is defined in UL 1581 - 1997, Reference Standard for Electrical Wires, Cables, and Flexible Cords. Products such as Types NM, SE, UF, etc. meet the requirements of this test.
(2) Cables installed in construction Types I and II; in cable trays; and in ducts, plenums, and other spaces not used to transport environmental air. Cables utilized in a construction Types I and II, in cable trays, and in ducts, plenums, and other spaces not used to transport environmental air shall meet a vertical tray flame test.
FPN No. 1: Building construction types are defined in NFPA 220 - 1998, Standard on Types of Building Construction, or the applicable building code, or both.
FPN No. 2: Vertical tray flame test is defined in UL 1685 - 1997, Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. Products such as Types AC, TC, MC, etc. meet the requirements of vertical tray flame test in this standard. Products marked for "limited smoke" meet the requirements of vertical tray flame test and smoke-release measurements in this standard.
(3) Cables installed vertically in shafts. Cables installed vertically in shafts shall meet a large-scale fire test for riser cables.
FPN: Large-scale fire test for riser cables is defined in UL 1666 - 1997, Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts. Types CL3R and CL2R, shown in Table 725-61, are examples of riser cables that meet the requirements of this test.
(4) Cables installed in ducts, plenums, and other spaces used to transport environmental air. Cables installed in ducts, plenums, and other spaces used to transport environmental air without the cables being enclosed in raceways in those spaces shall be capable of meeting a large-scale fire test for plenum cables.
FPN: Large-scale fire test for riser cables is defined in UL 910 - 1998, Test for Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables used in Spaces Transporting Environmental Air. Types CL3P and CL2P, shown in Table 725-61, are examples of plenum cables that meet the requirements of this test.
SUBSTANTIATION: [Note: The phrases "flame-retardant" (or "flame retardant") and "flame resistant" appear in 22 and 3 locations, respectively, in this Code. This is a general proposal that provides a basis to replace the phrases "flame-retardant" (or "flame retardant") and "flame resistant" by a phrase "flame tested" throughout the Code.]
Specific requirements applicable for a given product's performance when subjected to the required flame test are addressed in the product standard applicable for that product. The NEC does not define "flame-retardant" (or "flame retardant") because the performance requirements vary by product. One may suggest that the present use of the term "flame-retardant" is not measurable and therefore implies a false sense of security. Use of phrase "flame tested" or "fire tested" informs the user that the product shall be tested against the requirements for a specific flame test or fire test and directs the user's attention to seek further understanding about the given product's performance.
This proposal reflects the current relationship between the requirements in the Code and the applicable product standards for wire and cable products that are recognized in the Code. It is proposed to add this section in the general section of this article because the requirements for flame or fire test can be either product specific, or construction specific, or application specific. For example, flame test requirements for types of conductors recognized in Table 310-13 is covered in the applicable product standards for each type. Construction specific requirements can match the flame test performance requirement with type of building construction. Application specific requirements for installations in vertical risers and plenum spaces used for environmental air require products that can meet the applicable fire tests for their suitability in such applications.
Also, requirements for flame or fire tests for other products, where required, can be added in this section in the future.
Insulation and jacketing materials used with conductors and cables are required to provide necessary electrical, mechanical and flame or fire test performance in accordance with the requirements of the Code and the applicable product standards. In general, any improvement in one of these properties comes at the expense of the other two properties. This recommendation may facilitate harmonization of codes and standards. Also, it can promote development of cables that can deliver improved performance in all three properties whereby the insulation on conductor provides improved electrical and mechanical performance along with needed flame test performance. The overall assembly, on the other hand, can be designed and manufactured such that it provides improved mechanical and flame or fire test performance along with needed electrical performance. The overall product may have less smoke and less toxicity than products used today, which is a desirable goal.
Referencing of other NFPA standards and the test standards in the Fine Print Notes is in accordance with the latest editions of the NFPA Manual of Style and NEC Style Manual.
PANEL ACTION: Reject.
PANEL STATEMENT: Cables are listed for their flame retardant properties and some of their applications are referenced in the Code.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 11
VOTE ON PANEL ACTION:
AFFIRMATIVE: 10
NEGATIVE: 1
EXPLANATION OF NEGATIVE:
GANATRA: The panel should have either Accepted or Accepted in Principle this proposal. Proposal reflects the existing installations in the US and Canada. Panel Action could be to add a definition in Article 310:
"Flame Retardant. Where specified, products meet this requirement in accordance with the applicable product standard."
COMMENT ON AFFIRMATIVE:
GALAN: In addition to the information stated in the Panel Statement, it should be noted that the second sentence of proposed Paragraph 110-23, as written, allows for a conductor which is installed in a raceway to be exempt from a flame test. This goes against the present philosophy of the NEC. This would allow a construction, such as USE cable, which does not comply with a flame test and is presently not Listed, for installation inside a building, to be used throughout a building. UL's Guide information for Service-Entrance Cable states "Types USE and USE-2 are not suitable for use in premises or aboveground except to terminate at the service equipment or metering equipment." Sections 338-2 and 338-4(b) indicate that USE is not for use inside a building. Presently, all single conductor building wires (e.g., XHHW, RHW, THWN, and THW) must comply with a flame test. This proposal would allow for that to change, which is a step backward.

(Log #4345)

1- 243 - (110-23 (New)): Accept
SUBMITTER: Robert B. Alexander, Fluor Daniel
RECOMMENDATION: ADD a new section to read
Current Transformers. Unused current transformers, associated with potentially energized circuits, shall be short circuited.
SUBSTANTIATION: Section 450-1 Exception 1 specifically exempts current transformers from consideration in the rest of Article 450.
Open circuited current transformers can cause lethal voltages and fires. CTs not actively used in control, measurement or protection of potentially energized circuits should be short circuited.
PANEL ACTION: Accept.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3312)

1- 244 - (110-24 (New)): Reject
SUBMITTER: Jack Wells, Pass & Seymour/Legrand
RECOMMENDATION: Add a new Section 110-24 to read as follows:
110-24. Identification of Receptacles. Receptacles installed on a branch circuit shall be legibly marked to identify the disconnecting means for the branch circuit.
SUBSTANTIATION: To safely perform maintenance at a receptacle outlet, the circuit should be disconnected from the source of supply. Identifying the branch circuit disconnecting means at the receptacle will prompt personnel to recognize that the branch circuit disconnect must be open before beginning work at the receptacle outlet. This requirement in conjunction with identification of the disconnecting means in Section 110-22 provides easily accessible information that will result in an increased level of safety for personnel working at a receptacle outlet.
PANEL ACTION: Reject.

PANEL STATEMENT: This requirement seems extreme. Receptacles associated with a particular disconnect can be referenced at the disconnect.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #1505)

1- 245 - (110-26): Accept in Principle
SUBMITTER: Junior L. Owings, Rep. Oregon Chapter Int'l Assn. of Electrical Inspectors
RECOMMENDATION: Revise text as follows:
110-26. Spaces About Electrical Equipment. Sufficient access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment. Enclosures housing electrical apparatus that are controlled by lock and key shall be considered accessible to qualified persons. ...
(f) Dedicated Equipment Space. Equipment within the scope of Article 384, and motor control centers, shall be located in dedicated spaces and protected from damage as covered in (1) and (2).
Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.
(1) Indoor. For indoor installations, the dedicated space shall comply with the following.
a. Dedicated Electrical Space. The space equal to the width and depth of the equipment and extending from the floor to a height of 6 ft (1.83 m) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, or equipment foreign to the electrical installation shall be located in this zone.
Exception: Equipment that is isolated from the foreign equipment by height or physical enclosures or covers that will afford adequate mechanical protection from vehicular traffic or accidental contact by unauthorized personnel or that complies with b., shall be permitted in areas that do not have the dedicated space described in this rule.
b. Foreign Systems. The ~~space~~ area above the dedicated space required by 110-26(f)(1)(a), may contain foreign systems provided protection is installed to avoid damage from condensation, leaks, or breaks in such foreign systems. ~~equal to the width and depth of the equipment shall be kept clear of foreign systems unless protection is provided to avoid damage from condensation, leaks, or breaks in such foreign systems. This zone shall extend from the top of the electrical equipment to the structural ceiling.~~
c. Sprinkler Protection. Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.
d. Suspended Ceilings. A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.
(2) Outdoor. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in Section 110-26(a). No architectural appurtenance or other equipment shall be located in this zone.
SUBSTANTIATION: The wording between Sections 110-26(f)(1)(a) and 110-26(f)(1)(b) is unclear and confusing and could be in conflict with each other with the intent of the requirements. The proposed changes to the wording should clarify the confusion and potential conflict. This establishes that there is a truly dedicated space and that only the space above 6 feet above the equipment, if any, to the structural ceiling may have foreign systems installed only if the foreign system meets the requirements of having protection installed for the electrical equipment due to leaks, condensation, or breaks.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel concludes that Proposal 1-271a meets the submitter's intent.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #1744)

1- 246 - (110-26): Reject
SUBMITTER: Jamie McNamara, Hastings, MN
RECOMMENDATION: Revise as follows:
110-26 (e) Headroom. The minimum headroom of working spaces about service equipment, switchboards, panelboards, or motor control centers shall be 6 ft (1.98 m). Where the electrical equipment exceeds 6 ft (1.98 m) in height, the minimum headroom shall not be less than the height of the equipment. Headroom shall be maintained from equipment to outside the building.
Exception: Service equipment or panelboards, in existing dwelling units, that do not exceed 200 amperes.
SUBSTANTIATION: This will make it clear that the headroom is to be maintained until a person is outside and free of any and all obsticals.
PANEL ACTION: Reject.
PANEL STATEMENT: Headroom is required above the working space. Headroom outside the work spaces is beyond the scope of the NEC.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2924)

1- 247 - (110-26): Accept in Principle
SUBMITTER: Frank Pologruto, Rep. IBEW L.U. 98
RECOMMENDATION: Add a paragraph to 110-26 to read:
"Electrical equipment rooms with transformers that have a rating of 750 kVA or greater shall have doors that swing out into egress, equipped with panic hardware."
SUBSTANTIATION: In the last three code cycles, proposals to add this device to be included in the National Electrical Code. The response that was generated by the comments on proposals was indeed a concern for safety for electricians working in these electrical rooms.
I personally experienced a ground fault explosion of an electrical transformer where the entire building was put out of service, the personnel in the room had trouble getting out of the room due to the door being shut and had difficulty turning the door knob.
The panel statement suggested that this proposal be submitted to the Life Safety Code, however, the verbal response from the Life Safety Code was the same as the NEC. With safety in mind one can only be bewildered by a negative response from both the NEC and the Life Safety Code.
The unfortunate aspects of this proposal is that we have to submit a casualties count in order to get our point across. This proposal should belong in the National Electrical Code, especially if the Section 450-43(c) requires doors that swing out and equipped with panic bars, the panel can certainly see the need to change their position on panic bars in electrical rooms.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel believes that Proposal 1-260a addresses the submitter's concerns.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4427)

1- 248 - (110-26): Accept in Principle
SUBMITTER: Alan Chessman, Flag Electric
RECOMMENDATION: Add the following text:
All electric closet doors shall be installed with a panic bar so as to aid escape in case of emergency.
SUBSTANTIATION: I was in such a situation where a piece of electrical switchgear caught on fire. My partner and myself were caught in the electric room and when it filled with smoke we had to crawl out to the door. When we got to the door we tried to open it, but when I tried to pull on the door I could not get it open. It was a push open door, but with all of the smoke I could not tell that. Luckily for my partner and myself someone heard the explosion and opened the door to let us out. If there had been a panic door I could have gotten out with ease and my life would not have been in danger.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel believes that Proposal 1-260a addresses the submitters concerns.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4451)

1- 249 - (110-26(a)): Accept in Principle
SUBMITTER: Jennfier G. Lambert, Long Electric
RECOMMENDATION: Add the following text:
In office buildings, hospitals, schools, and all other public buildings where electrical equipment is housed in a separate room, the exit door shall be equipped with a crash bar type exit for the safety and security of qualified persons working in these areas.
SUBSTANTIATION: In the unfortunate event of a panel fire, explosion, or other emergency in these specified rooms, the person or people (if burned, electrocuted) can quickly escape the hazardous area.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel believes that Proposal 1-260a addresses the submitter's concerns.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #447)

1- 250 - (Table 110-26(a)): Accept in Principle
SUBMITTER: Technical Correlating Committee National Electrical Code
RECOMMENDATION: Revise Table 110-26(a) to read as follows.
(Table shown below)
SUBSTANTIATION: The proposed revision is intended to comply with the NFPA No. 1M Manual of Style Section 4.1 with respect to the placement of units and values of measurement, i.e., show the SI units as the preferred and inch-pound units immediately following in parenthesis.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: Editorially added Condition No. 1 heading. Incorporated the proposed table in this proposal into Proposal 1-252a.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3003)

1- 251 - (Table 110-26(a)): Reject
SUBMITTER: Sukanta Sengupta, FMC Corp.
RECOMMENDATION: Revise first sentence as follows:
Exposed live parts on one side and exposed live parts on other side of working space effectively guarded by suitable insulating materials or exposed live parts on both sides effectively guarded by suitable insulating materials.
SUBSTANTIATION: A clarification of "no live or grounded parts" is presented to minimize any confusion.
PANEL ACTION: Reject.
PANEL STATEMENT: The present text is clear and the proposal represents a misunderstanding of the requirements by the submitter.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2097)

1- 252 - (Table 110-26(a) Note): Reject
SUBMITTER: Joel A. Rencsok, Scottsdale, AZ
RECOMMENDATION: Add at the start of each Condition before the words (exposed live parts) the following words (the enclosure or)
Condition 1 — The enclosure or exposed live parts on one side and no live or grounded parts on the other side of the working space, or the enclosure or exposed live parts on both sides effectively guarded by suitable wood or other insulating materials. Insulated wire or insulated busbars operating at not over 300 volts to ground shall not be considered live parts.
Condition 2 — The enclosure or exposed live parts on one side and grounded parts on the other side. Concrete, brick, or tile walls shall be considered as grounded.
Condition 3 — The enclosure or exposed live parts on both sides of the work space (not guarded as provided in Condition 1) with the operator between.
SUBSTANTIATION: The main section refers to the enclosure but the conditions do not.
By adding these words will correlate the main requirement to the conditions.
This will make the notes more understandable.
Appears that the intent is to require the enclosure to the conditions but does not state in conditions.

Table 110-26(a) Working Spaces

Nominal Voltage to ground	Minimum Clear Distance Condition 1	Condition 2	Condition 3
0-150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151-600	900 mm (3 ft)	1 m (3 1/2 ft)	1.2 m (4 ft)

Note: Where the conditions are as follows:

Conditions 1, 2 and 3 remain unchanged.

PANEL ACTION: Reject.
PANEL STATEMENT: The panel concludes that the additional wording does not add clarity to the requirements. Refer to Proposal 1-252a.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #CP102)

1- 252a - (110-26(a)(1)): Accept
SUBMITTER: CMP 1
RECOMMENDATION: Revise text as follows:

(1) Depth of Working Space. The depth of the working space in the direction of live parts shall not be less than ~~indicated~~ that specified in Table 110-26(a), ~~except where~~unless the requirements in (a), (b), or (c) are met. Distances shall be measured from the exposed live parts ~~if such are exposed~~,or from the enclosure or opening if ~~such~~ the live parts are enclosed.

Table 110-26(a) Working Spaces

Nominal Voltage to ground	Condition 1	Minimum Clear Distance Condition 2	Condition 3
0-150	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151-600	900 mm (3 ft)	1 m (3 1/2 ft)	1.2 m (4 ft)

Note: Where the conditions are as follows:
Conditions 1, 2 and 3 remain unchanged.

~~Exception No. 1:~~ (a) Dead-front assemblies. Working space shall not be required in back or sides of assemblies, such as dead-front switchboards or motor control centers, ~~where there are no renewable or adjustable parts, such as fuses or switches, on the back or sides and~~ where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on ~~de-energized~~ non-electrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) ~~horizontally~~ shall be provided.
~~Exception No. 2:~~ (b) Low voltage. By special permission, smaller working spaces shall be permitted where all uninsulated parts ~~are at a voltage~~ operate at no greater than 30 volts rms, 42 volts peak, or 60 volts dc.
~~Exception No. 3:~~ (c) Existing buildings. In existing buildings where electrical equipment . . . [no change to balance of text]
SUBSTANTIATION: The substantiation for this panel proposal is as follows:
a.) To minimize the use of exceptions and express Code requirements in positive language as required by 3.1.4 of the NEC Style Manual.
b.) To incorporate metric changes into Table 110-26(a).
c.) To substitute the word non-electrical for de-energized in 110-26(a)(1) for clarity.
d.) To retain the soft metric conversion of 30 inches equals 762 mm in Section 110-26(a)(1) for safety reasons to avoid reducing the work space.
e.) To incorporate some of the material from Proposals 1-254 and 1-287 and 1-250.
PANEL ACTION: Accept.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2853)

1- 253 - (Table 110-26(a)(1) Note 2 (New)): Reject
SUBMITTER: Sukanta Sengupta, FMC Corp.
RECOMMENDATION: Add a new Note 2 to Table 110-26(a) and renumber existing the Note 2 to Note 3.
New Note 2:
In all (3) conditions the minimum clear distance shall be increased to permit at least 90 degree opening of enclosures with hinged doors or hinged panels without touching any parts of the opposite side. For enclosures with sliding doors or removable panels the requirements of Table 110-26(a) remain unchanged.
SUBSTANTIATION: This note is required to cover installations where the width of a hinged door or a hinged panel is more than the minimum clear distance of Table 110-26(a).
PANEL ACTION: Reject.
PANEL STATEMENT: The concern of the submitter is addressed in existing Section 110-26(a)(2). Also, there is no substantiation for increasing the work space dimension.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3258)

1- 254 - (110-26(a)(1), Exception): Accept in Principle
SUBMITTER: Alan Manche, Square D Co.
RECOMMENDATION: Revise NEC 110-26(a)(1) Exception No. 1 with the additions (underlined) and deletions (strike through) as shown. The entire text of 110-26(a) Exception No. 1 is shown for clarity, but only those changes shown underlined or strike through are part of this proposal.
Exception No. 1: Working space shall not be required in back or sides of assemblies, such as dead-front switchboards or motor control centers, where there are no renewable or adjustable parts, such as fuses or switches, on ~~the~~ that back or sides and where all connections are accessible from other required working space. ~~locations other than the back or sides.~~ Where rear access is required to work on de-energized parts on the back of enclosed equipment, a minimum working space of 30 in. (762 mm) horizontally shall be provided.
SUBSTANTIATION: 110-26(a)(1) Exception 1 was revised in the 1999 cycle by adding "or sides" following the word "back" to indicate that working space is also not required at the sides when certain criteria is met. This was a little too simplistic. The last phrase of the first sentence ("… accessible from locations other than the back or sides.") could be interpreted to indicate that you can only eliminate side or back working space when everything is accessible from the front.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel believes that the action on Proposal 1-252a meets the intent of the submitter.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #397)

1- 255 - (110-26(a)(2)): Reject
SUBMITTER: Michael J. Hartley, Rep. IBEW Local 292
RECOMMENDATION: Revise 110-26(a)(2) to read as follows:
(2) Width of Working Space. The width of working space in front of the electric equipment shall be the width of the equipment or 30 in. (762 mm) whichever is greater. It shall also be kept a minimum of 12 in. away from any wall perpendicular to equipment. In all cases...
SUBSTANTIATION: With room getting taken away consistently by architects from the electrical rooms, I am more and more seeing panels stuffed into room corners making a front on view of breaker landing spots almost impossible to do without compromising safety of the wireman.

PANEL ACTION: Reject.
PANEL STATEMENT: The proposal seems to address location of equipment rather than the width of the work space. There is no substantiation presented for increasing the width of the work space beyond the present requirements.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2805)

1- 256 - (110-26(a)(2)): Reject
SUBMITTER: Bud Swathwood, Bud Swathwood Consulting
RECOMMENDATION: Add sentence to paragraph (2) to read:
In addition to the space for the 90 degree opening of the door there shall be 6 in. space more than the width of the door and the opposite wall or boundry.
SUBSTANTIATION: This addition will make it clear that there must be enough space allowed for large doors especially, to open easily. Some installers leave only enough room for the doors to open and sometimes scrape the opposite wall or "bind" when opened. This addition will also help to meet the OSHA standard 1910.303 (g) (i) (1)(i).
PANEL ACTION: Reject.
PANEL STATEMENT: The concern of the submitter is addressed in existing Section 110-26(a)(2). Also, there is no substantiation for increasing the work space dimension.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4157)

1- 257 - (110-26(a)(2) Exception No. 2): Reject
SUBMITTER: Frederic P. Hartwell, Hartwell Electrical Services, Inc./Rep. Massachusetts Electrical Code Advisory Committee
RECOMMENDATION: Revise Exception No. 2 as follows:
Exception No. 2: By special permission, smaller spaces may be permitted (1) where it is judged that the particular arrangement of the installation will provide adequate accessibility; or (2) where all uninsulated parts are at a voltage no greater than 30 volts RMS, 42 volts peak, or 60 volts dc.
SUBSTANTIATION: This proposal restores the 1993 NEC permission for the inspector, by special permission, to allow clearance reductions where "the particular arrangement of the installation will provide adequate accessibility." The lack of this language routinely sends inspectors off into Section 90-4, which is far less desirable, and which doesn't even invoke special permission. The special permission process is appropriate in the many instances where clearances cannot quite be obtained.
I can remember granting special permission under this rule in a case where the clearance to part of the panel front was 36 inches, but due to an unusual opposing wall construction, another part of the panel only had 33 inches of clearance (36 inches was required). Here, the fact that the opposing wall was wood, and that the space was very well lit, and the fact that not allowing the location would have dramatically escalated the cost of the job without significantly increasing safety, all combined to make my decision fairly easy. Another example involved spacing between a 24-ft switchboard lineup and an opposing masonry wall. Yes, there was the required 42 in., except where a 6 ft by 4 ft air intake grille protruded into the room 1 1/2 in. due to an oversight. With the degree of qualified maintenance and supervision involved at this facility, again the inspector had a clear conscience in not requiring reconstruction of the room at negligible safety benefit.
In the real world, inspectors have to confront these problems and make decisions based on the total picture. The Code should resume allowing this sort of latitude instead of making officious bureaucrats out of the inspectors who have to live with these decisions. This permission continues very successfully in Massachusetts by state rule since it dropped from the 1996 NEC.
PANEL ACTION: Reject.
PANEL STATEMENT: The panel understands that the referenced section is 110-26(a)(1), Exception No. 2. The panel reaffirms that this provision is covered by 90-4.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #373)

1- 258 - (110-26(a)(3)): Reject
SUBMITTER: Dan Leaf, Palmdale, CA
RECOMMENDATION: Add:
Meters, recorders, and similar apparatus that are installed as an integral part of listed equipment shall be permitted to extend not more than 12 in. (305 mm) beyond the front of the electrical equipment.
SUBSTANTIATION: The allowance for a 6 in. intrusion into the work space appears to be concerned with associated equipment such as small transformers, wireways or gutters, and the like although "equipment" (apparatus) may be construed to include watt-hour meters, etc. Such meters in separate sockets or part of a combination panelboard for smaller services are generally 6 in. or less in depth. However watt-hour, kilovar, etc. meters mounted on some switchboards and panelboards may have a depth exceeding 6 in. Work space measured from the face of such apparatus could be interpreted to require an increase in the required space fromt he switchboard enclosure for the entire length of the equipment per (a)(2).
PANEL ACTION: Reject.
PANEL STATEMENT: The submitter has not included any substantiation of an actual field problem.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #648)

1- 259 - (110-26(a)(3)e): Reject
SUBMITTER: Bruce Fairweather, Electrical Safety Inc.
RECOMMENDATION: New subparagraph 1. Branches from busways installed in accordance with section 364-8 (b) and retractable cable containers shall maintain a minimum headroom clearance of 6 and 1/2 feet between the drop cable connector or the container and the floor.
SUBSTANTIATION: Many industrial plants have setup and test stations that require equipment to be tested prior to packaging and shipping. In my surveys of these sites I find numerous cases where the length of the vertical bus drop cable from the strain relief is quite long encroaching into what would otherwise be walking space and aisle. The encroachment has resulted in head injuries when an employee comes in contact with the dangling connector. There doesn't appear to be specific language anywhere on minimum headroom clearance for bus drop cable or retractable cable assemblies. This should provide it.
PANEL ACTION: Reject.
PANEL STATEMENT: The problem described is not related to required working space about electrical equipment covered by this Section.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4471)

1- 260 - (110-26(b)): Reject
SUBMITTER: Roy Mundt, Miller-Eads Electrical Contractors
RECOMMENDATION: Recommend that crash bars be put on all electrical closets so that no knobs have to be turned in case of an emergency.
SUBSTANTIATION: If one person is in an electrical closet and something goes wrong they must find the knobs and turn. But if crash bars were installed all you have to do is hit the bar with any part of your body and you're out the door.
PANEL ACTION: Reject.
PANEL STATEMENT: The proposal does not contain recommended text as required by Section 4-3.3(c) of the Regulations Governing Committee Projects.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #CP103)

1- 260a - (110-26(c)): Accept
SUBMITTER: CMP 1
RECOMMENDATION: Revise as follows:
(c) ~~Access and~~ Entrance to Working Space. ~~At least one entrance of sufficient area shall be provided to give access to the working spaces about electrical equipment.~~
(1) Minimum Required. At least one entrance of sufficient area shall be provided to give access to the working space about electrical equipment.
(2) Large Equipment. For equipment rated 1200 amperes or more and over 1.8 m (6 ft) ~~(1.83 m)~~ wide that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to the required working space not less than 610 mm (24 in.) ~~(610 mm)~~ wide and 2.0 m (6_ ft) ~~(1.98 m)~~ high at each end of the working space. Where the entrance has a personnel door(s), the door(s) shall open in the direction of egress and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.
A single entrance to the required working space shall be permitted where either of the conditions in (a) or (b) are met.
~~Exception No. 1:~~ (a) Unobstructed exit. Where the location permits a continuous and unobstructed way of exit travel, ~~one means of access~~ a single entrance to the working space shall be permitted.
(b) Extra working space. Where the depth of the working space is twice that required by 110-26(a), a single entrance shall be permitted. It shall be located so that the distance from the equipment to the nearest edge of the entrance is not less than the "Minimum Clear Distance" specified in Table 110-26(a) for equipment operating at that voltage and in that condition.
~~Exception No. 2: Where the work space required by Section 110-26(a) is doubled, only one entrance to the work space is required. It shall be located so the edge of the entrance nearest the equipment is the minimum clear distance given in Table 110-26(a) away from such equipment.~~
SUBSTANTIATION: The substantiation for this panel proposal CP103 is as follows:
a.) To minimize the use of exceptions and express Code requirements in positive language as required by 3.1.4 of the NEC Style Manual.
b.) Incorporate metric changes.
c.) Retained the soft metric conversion of 24 inches equals 610 mm in Section 110-26(c)(2) for safety reasons to avoid reducing the opening to the required workspace.
e.) Incorporated some of the material from Proposals 1-247 and 1-287 and 1-250.
f.) The panel recognizes that the safety of workers who are exposed to energized conductors is of great concern. The revision will limit the application of the requirement for panic hardware to personnel doors to workspaces where doors are provided.
PANEL ACTION: Accept.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #668)

1- 261 - (110-26(c) and Exception No. 1): Reject
SUBMITTER: Dan Leaf, Palmdale, CA
RECOMMENDATION: Add to second paragraph:
"Width determination shall be applied to contiguous equipment supplied by a common set of conductors."
Revise Exception No. 1 to read as follows:
Exception No. 1: Where the location permits a continuous and unobstructed way of exit travel without passing through the required work space one means of access shall be permitted.
SUBSTANTIATION: Width should be indicated to apply to the width totality of separate equipment where installed side-by-side (with side panels) and individually fed from above or through nipples between equipment sides by the same set of conductors. This is essentially the same as one equipment.
The exception may have contemplated an exit travel at right angles from equipment, but can be construed as permitting exit travel parallel to equipment and within required work space. In a U-shaped configuration of equipment, one entrance at the open end would be at "each end" and technically conform to the exception, or may be interpreted as complying with Exception No. 2. If an electrical mishap occurs at the entrance (exit) end a person would have to exit near the occurance.
Note: Supporting material is available for review at NFPA Headquarters.
PANEL ACTION: Reject.
PANEL STATEMENT: The panel believes the present language is clear. Requirements for access to work space are not dependent on the nature of supply to the equipment. Exiting the working space through the required means of access may well require traveling through the workspace.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #1456)

1- 262 - (110-26(c)): Reject
SUBMITTER: Daniel McIntyre, Town of Westwood, MA
RECOMMENDATION: Insert "400 ampere".
Delete "1200 ampere or more and over 6 ft wide."
(c) Access and Entrance to Working Space. At least one entrance of sufficient area shall be provided to give access to the working space about electric equipment.
For equipment rated ~~1200 amperes or more and over 6 ft (1.83 m) wide~~ that contains overcurrent devices, switching devices, or control devices, there shall be one entrance not less than 24 in. (610 mm) wide and 6 1/2 ft (1.98 m) high at each end of the work space.
SUBSTANTIATION: Residential homes with 400 ampere and larger services, are installing generator backup power, requiring large transfer switches to be installed and in some cases in very restricted access locations.
PANEL ACTION: Reject.
PANEL STATEMENT: The substantiation provided is insufficient to justify the proposed change.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2887)

1- 263 - (110-26(c)): Accept in Principle in Part
SUBMITTER: James Maldonado, City of Tempe, AZ/Rep. Central Arizona Chapter IAEI
RECOMMENDATION: Add new paragraph at the end of Section 110-26(c) after Exceptions No. 1 and 2 to read as follows:
All rooms or spaces as described in Section 110-26(a), dedicated to electric equipment, shall have all doors open outward. Such doors shall be a minimum of 24 in. (610 mm) wide and 6-1/2 ft (1.98m) high.
SUBSTANTIATION: Electrical equipment less than 1200 amps does not require any specific size of access and entrance to working space. There is also no requirement to be able to exit the working space after a person enters. If an emergency occurs, there will not be adequate access for emergency teams. If the entrance or access door opens inward and slows down emergency egress during a fault the severity of burns and bodily injury a person may receive is directly related to the distance a person is away from the faulting equipment. An inward opening door restricts that exiting speed and increases the possibility of more severe injuries.
PANEL ACTION: Accept in Principle in Part.
PANEL STATEMENT: The panel rejects the "all rooms" requirement as being overly restrictive. The panel believes that panel Proposal 1-260a partially addresses the submitter's concern of egress. The substantiation does not totally support the recommendations.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2888)

1- 264 - (110-26(c)): Reject
SUBMITTER: James Maldonado, City of Tempe, AZ/Rep. Central Arizona Chapter IAEI
RECOMMENDATION: Add a new paragraph at the end of Section 110-26(c) after Exceptions No. 1 and 2 to read as follows:
Access and Entrance to Working Space.
For electric equipment having hinged doors or panels, a clear means of egress shall be provided when doors or panels are open in any position. Such means of egress shall not be less than 24 in. (610 mm) in width.
SUBSTANTIATION: This requirement allows for emergency egress from electrical equipment when the door or panels block the means

of access or egress. Since 24 in. is required as a means of access it is unclear when this clearance is required, with or without the doors open. There have been many times equipment has been installed close to walls or other equipment that when the doors are open the access and egress space is reduced or eliminated. This clear path is essential during emergencies.
PANEL ACTION: Reject.
PANEL STATEMENT: The proposal would, in effect, require an increase in size of the work space. There is no substantiation that work spaces need to be larger than those required in Table 110-26(a). The situation described by the submitter is best addressed by safe work practices.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3846)

1- 265 - (110-26(c)): Accept in Principle
SUBMITTER: Lanny McMahill, Phoenix, AZ
RECOMMENDATION: Add the following text:
Entrance doors shall open outward from the working space. Such doors shall be not less than 24 in. (610 mm) wide and 6-1/2 ft (1.98 m) high.
SUBSTANTIATION: The possibility of a door opening into a working space can create a potential unsafe condition for service personnel. Requiring the doors to open outward from the working space eliminates this problem. Sufficient area is not defined in the Code. Requiring a minimum size door clarifies sufficient area.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel believes that the submitter's concerns are addressed in Proposal 1-260a.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4459)

1- 266 - (110-26(c)): Reject
SUBMITTER: David E. Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education
RECOMMENDATION: Add the following text:
At least one entrance of sufficient area , providing a continuous and unobstructed way of exit travel, shall be provided.
SUBSTANTIATION: "Sufficient area" is a difficult judgment call, which is most likely why the language guidance for the NEC discourages the use of terms such as "sufficient." In dealing with equipment rated less than 1200 amperes, the presently-required space is adequate for the actual work. However, even aside from the fact that it can be reduced by setting down a panelboard cover, it is marginally adequate for flinching and meaningless in terms of the need to flee. I can prevail upon customers to clear the required working space. It will help, though, to have a section that says, "See to it that you can get at your fuse box when there is urgent need. See to it that I don't have to clamber over cardboard boxes that stand between the 30 inches by three feet if I need to get away from your panel without moving like a crab sideways." To get at the fuse box of one lady in her mid-80's, I had to crawl through a structure that once had been a wall-in-the-making, consisting of vertical two-by-fours on 16 inch centers with a horizontal, firestop type bracing member between them about three feet up. Was the area adequately illuminated? A judgment call. I couldn't say no with absolute certainty, until I stood in front of the panel, where I couldn't help but block the light with my body. Based on her experience in changing fuses (actually, in having others change fuses--she just couldn't get at them) she offered me a candle! Was all this absurd? Yes. Illegal? Not explicitly. Other cases are harder to call, but still dangerous.
PANEL ACTION: Reject.
PANEL STATEMENT: The requirement is to assure access to the work space. Requiring and maintaining a path through the building is not within the Scope of the NEC Committee. The problem addressed may best be handled by the use of safe work practices or housekeeping.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4473)

1- 267 - (110-26(c)): Reject
SUBMITTER: Glenn Soles, Clark County Building Dept., NV/Rep. Southwestern Section IAEI
RECOMMENDATION: Add a new paragraph at the end of section 110-26 (c) after Exceptions No. 1 and No. 2 to read as follows:
"Access and Entrance to Working Space. For electric equipment having hinged doors or panels, a clear means of egress shall be provided when doors or panels are open in any position. Such means of egress shall not be less than 24 inches (610 mm) in width."
SUBSTANTIATION: This requirement allows for emergency egress from electrical equipment when the door or panels block the means of access or egress. Since 24" is required as a means of access it is unclear when this clearance is required, with or without the doors open. There have been many times equipment has been installed close to walls or other equipment that when the doors are open the access and egress space is reduced or eliminated. This clear path is essential during emergencies.
PANEL ACTION: Reject.
PANEL STATEMENT: The proposal would, in effect, require an increase in size of the work space. There is no substantiation that work spaces need to be larger than those required in Table 110-26(a). The situation described by the submitter is best addressed by safe work practices.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #301)

1- 268 - (110-26(d)): Accept in Principle
SUBMITTER: Vincent Metallo, Sr., Baltimore County, MD
RECOMMENDATION: Revise 110-26(d) to read as follows:
Additional lighting fixtures shall not be required where the work space is illuminated by an adjacent light source (or as permitted by 210-70(a)(1) Exception No. 1.
SUBSTANTIATION: Many times panels are located in habital rooms of dwelling units. The lighting requirements for these rooms can be met by a switched controlled receptacle by 210-70(a)(1) Exception No. 1. Inspectors are requiring lighting fixtures in front of these panels even if these rooms have a switched controlled receptacle. If 210-70(a)(1) Exception No. 1 provides proper illumination for the room, then it provides proper illumination for a panel in this room.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel agrees with the submitter's substantiation, but chose to make the recommended addition in Proposal 1-269. The panel believes that the submitter was addressing the second sentence only.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #669)

1- 269 - (110-26(d)): Accept in Principle
SUBMITTER: Dan Leaf, Palmdale, CA
RECOMMENDATION: Revise second sentence:
Additional lighting outlets ~~fixtures~~ shall not be required where the work space is illuminated by an adjacent light source.
SUBSTANTIATION: Editorial. The definition of lighting outlet includes provisions for a lampholder or pendant cord terminating in a lampholder, which are apparently not considered lighting fixtures, per se. Present wording infers if additional lighting is required, lampholders are not permitted.
PANEL ACTION: Accept in Principle.
Revise Section 110-26(d) to read as follows:
"(d) Illumination. Illumination shall be provided for all working spaces about service equipment, switchboards, panelboards, or motor control centers installed indoors. Additional lighting outlets fixtures shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210-70(a)(1), Exception No. 1. In electrical equipment rooms, the illumination shall not be controlled by automatic means only."
PANEL STATEMENT: CMP-1 does not want proposal 1-1 to affect this proposal. The reference to Section 210-70 was added to clarify which lighting sources are permitted. See panel action and statement on Proposal 1-268.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #300)

1- 270 - (110-26(e)): Reject
Note: It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 13 for information.
SUBMITTER: Vincent Metallo, Sr., Baltimore County, MD
RECOMMENDATION: Revise 110-26(e) to read as follows:
The minimum head room of working spaces about service equipment, switchboards, panelboards, transformers, or motor control centers shall be 6 1/2 ft (1.98 m).
SUBSTANTIATION: Transformers can be installed in a crawl space as long as they meet article 450-13 and 450-21. Trouble shooting and maintenance can be dangerous by working on exposed live parts on your knees or sitting in front of the equipment. Low headroom makes a quick escape impossible.
PANEL ACTION: Reject.
PANEL STATEMENT: There is insufficient substantiation presented to consider transformers, in general, as a type of equipment needing work space headroom required of switchboards, panelboards, or motor control centers. Refer to CMP-13 for information.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3860)

1- 271 - (110-26(e), Exception): Accept
Note: The Technical Correlating Committee directs the panel to review the sequence and values on the metrication. This action will be considered by the Panel as a Public Comment.
SUBMITTER: J. Philip Simmons, Olympia, WA
RECOMMENDATION: Revise the exception as follows:
Exception: In existing dwelling units, service equipment or panelboards~~, in existing dwelling units~~, that do not exceed 200 amperes shall be permitted in spaces where the headroom is less than 6-1/2 ft (1.98 m).
SUBSTANTIATION: This proposal is intended to bring this exception into compliance with the NEC Style Manual by making the exception into a complete sentence.
PANEL ACTION: Accept.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #CP104)

1- 271a - (110-26(f)): Accept
SUBMITTER: CMP 1
RECOMMENDATION: Revise Section 110-26(f) to read as follows:
(f) Dedicated Equipment Space. ~~Equipment within the scope of Article 384, and~~ All switchboards, panelboards, distribution boards and motor control centers shall be located in dedicated spaces and protected from damage ~~as covered in (1) and (2)~~.
Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.
(1) Indoor. Indoor installations~~, the dedicated space~~ shall comply with the following.
(a) Dedicated Electrical Space. The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft.) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.
Exception: ~~Equipment that is isolated from the foreign equipment by height or physical enclosures or covers that will afford adequate mechanical protection from vehicular traffic or accidental contact by unauthorized personnel or that complies with (b), shall be permitted in areas that do not have the dedicated space described in this rule.~~ Suspended ceilings with removable panels shall be permitted within the 1.8 m (6 ft.) zone.
(b) Foreign Systems. The area above the dedicated space required by 110-26(f)(1)(a) shall be permitted to contain foreign systems provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.
(c) Sprinkler Protection. Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.
(d) Suspended Ceilings. A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.
(2) Outdoor. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in Section 110-26(a). No architectural appurtenance or other equipment shall be located in this zone.
SUBSTANTIATION: The panel provides the following substantiation:
a.) The panel identified specific equipment to be covered by this section for clarity.
b.) The panel clarified that leak protection apparatus is not allowed in the dedicated space.
c.) The panel modified the exception to allow suspended ceilings with removeable panels in the dedicated space.
d.) The panel revised (b) foreign systems to specifically identify where these foreign system are allowed.
e.) The panel placed hard metric dimensions before inch-pound units.
PANEL ACTION: Accept.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #363)

1- 272 - (110-26(f)): Reject
SUBMITTER: Kenneth W. Birringer, University of Michigan
RECOMMENDATION: Revise to read as follows:
"Equipment within the scope of Article 384, motor controllers other than attachment plugs and receptacles, and motor control centers,..."
SUBSTANTIATION: Motor controllers including combination motor starters and adjustable speed controllers are often maintained and tested while they are energized and their access doors are open. A dedicated equipment space should be required.
A. To ensure personnel safety during equipment maintenance and testing.
B. To protect this equipment from damage.
PANEL ACTION: Reject.
PANEL STATEMENT: Motor controllers require work space per Section 110-26. The substantiation addresses the need for work space and not a need for dedicated space.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3756)

1- 273 - (110-26(f)): Accept in Principle
SUBMITTER: Timothy M. Croushore, Allegheny Power Service Corp.
RECOMMENDATION: 1. Delete the exception to 110-26(f)(1)(a) Dedicated Electrical Space.
2. Reword (b) and (c) to read as follows:
(b) Foreign Liquid Systems. The space equal to the width and depth of the equipment shall be kept clear of foreign liquid systems unless protection is provided to avoid damage from condensation, leaks, or breaks in such foreign liquid systems. This zone shall extend from the top of the electrical equipment to the structural ceiling.
(c) Sprinkler Protection. Sprinkler protection shall be permitted for the dedicated space where the piping is outside of the dedicated space as required in (a) Dedicated Electrical Space, above and where the electrical equipment is protected from damage from condensation, leaks, or breaks in the piping.
Exception: Dry pipe sprinkler systems shall not be required to have protection from damage from condensation, leaks, or breaks.
SUBSTANTIATION: The above changes fix the conflicting text problems with current language of Section 110-26(f) and the exception to 110-26(f)(1)(a) Dedicated Electrical Space.
PANEL ACTION: Accept in Principle.

PANEL STATEMENT: The panel concludes that Proposal 1-271a addresses the problem identified in the submitter's substantiation.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4087)

1- 274 - (110-26(f)): Accept in Principle
SUBMITTER: Thomas E. Trainor, City of San Diego, CA
RECOMMENDATION: Revise Section 110-26(f) to read as follows:
(f) Dedicated Equipment Space. Equipment within the scope of Article 384, and motor control centers, shall be located in dedicated spaces and protected from damage ~~as covered in (1) and (2)~~.
Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.
(1) Indoor. ~~For i~~ Indoor installations~~, the dedicated space~~ shall comply with the following.
a. Dedicated Electrical Space. The space equal to the width and depth of the equipment and extending from the floor to a height of 6 ft (1.83 m) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, or equipment foreign to the electrical installation shall be located in this zone.
~~Exception: Equipment that is isolated from the foreign equipment by height or physical enclosures or covers that will afford adequate mechanical protection from vehicular traffic or accidental contact by unauthorized personnel or that complies with b., shall be permitted in areas that do not have the dedicated space described in this rule.~~
b. Foreign Systems. ~~The space equal to the width and depth of the equipment shall be kept clear of foreign systems unless protection is provided to avoid damage from condensation, leaks, or breaks in such foreign systems. This zone shall extend from the top of the electrical equipment to the structural ceiling.~~ Piping, ducts, and other equipment foreign to the electrical installation shall be permitted above the dedicated electrical space where shields or covers are installed that protect the electrical equipment from condensation, leaks, or breaks in such foreign systems.
c. Sprinkler Protection. Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.
d. Suspended Ceilings. A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.
(2) Outdoor. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in Section 110-26(a). No architectural appurtenance or other equipment shall be located in this zone.
SUBSTANTIATION: Subsection (1)(a) requires a minimum dedicated space above switchboards and motor control centers to allow for the safe and proper installation of conduit or cable entering or leaving such equipment. Equipment foreign to the electrical installation is prohibited in this dedicated space.
As presently written, Subsection (1)(b) directly contradicts Subsection (1)(a) by permitting ducts and piping in the area above switchboards so long as protection is provided from leaks or spillage. Subsection (1)(b) specifically allows this "protection" to be installed at the top of the equipment and totally ignores the need for conduit and cable space in order for this equipment to be properly and safely installed. The need for a minimum dedicated "wiring" space was fully documented in several proposals for the 1999 NEC and accepted by the panel in Subsection (1)(a). It is necessary and important for Subsection (1)(b) to be revised to recognize this minimum requirement.
Previous editions of the NEC have implied that protection is required from accidental spillage or leakage from piping systems, from damage by vehicular traffic, and to prevent accidental contact by unauthorized personnel. This implication arises because of the mention of these issues in the exception to (1)(a). In my opinion, this exception is meaningless since it provides exceptions to requirements that don't exist in (1)(a). In fact, it was first written to provide relief from the 25 ft requirement in industrial plants and, with the change to 6 ft, is not longer needed. The proposed revision includes the deletion of the exception and the deletion of the reference to "(1) and (2)" in (f) so that the basic requirement is to provide protection from damage. Trying to list all of the specific ways this equipment could be damaged is inappropriate. If one type of damage is not on the list, then there is no requirement to provide protection for it.
If this proposal is accepted, Section 110-26(f) would read as follows:
(f) Dedicated Equipment Space. Equipment within the scope of Article 384, and motor control centers, shall be located in dedicated spaces and protected from damage.
Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.
(1) Indoor. Indoor installations shall comply with the following:
a. Dedicated Electrical Space. The space equal to the width and depth of the equipment and extending from the floor to a height of 6 ft (1.83 m) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, or equipment foreign to the electrical installation shall be located in this zone.
b. Foreign Systems. Piping, ducts, and other equipment foreign to the electrical installation shall be permitted above the dedicated electrical space where shields or covers are installed that protect the electrical equipment from condensation, leaks, or breaks in such foreign systems.
c. Sprinkler Protection. Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.
d. Suspended Ceilings. A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.
(2) Outdoor. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in Section 110-26(a). No architectural appurtenance or other equipment shall be located in this zone.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel concludes that Proposal 1-271a meets the submitter's intent.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4158)

1- 275 - (110-26(f)): Accept in Part
SUBMITTER: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
RECOMMENDATION: Revise as follows:
(f) Dedicated Equipment Space. Equipment within the scope of Article 384, and motor control centers, shall be located in dedicated spaces and protected from damage as covered in (1) and (2).
Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.
(1) Indoor. For indoor installations, ~~the dedicated space shall comply with the following.~~
a. Dedicated Electrical Space. ~~The space equal to the width and depth of the equipment and extending from the floor to a height of 6 ft (1.83 m) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, or equipment foreign to the electrical installation shall be located in this zone.~~
~~Exception: Equipment that is isolated from the foreign equipment by height or physical enclosures or covers that will afford adequate mechanical protection from vehicular traffic or accidental contact by unauthorized personnel or that complies with b., shall be permitted in areas that do not have the dedicated space described in this rule.~~
~~b. Foreign Systems.~~ The space equal to the width and depth of the equipment shall be kept clear of foreign systems unless protection is provided to avoid damage from condensation, leaks, or breaks in such foreign systems. This zone shall extend from the top of the electrical equipment to the structural ceiling.
~~c. Sprinkler Protection.~~ Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.
~~d. Suspended Ceilings.~~ A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.
(2) Outdoor. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in Section 110-26(a). No architectural appurtenance or other equipment shall be located in this zone.

As revised, the subsection would read as follows:

(f) Dedicated Equipment Space. Equipment within the scope of Article 384, and motor control centers, shall be located in dedicated spaces and protected from damage as covered in (1) and (2).

Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.

(1) Indoor. For indoor installations, the space equal to the width and depth of the equipment shall be kept clear of foreign systems unless protection is provided to avoid damage from condensation, leaks, or breaks in such foreign systems. This zone shall extend from the top of the electrical equipment to the structural ceiling. Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section. A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

(2) Outdoor. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in Section 110-26(a). No architectural appurtenance or other equipment shall be located in this zone.

SUBSTANTIATION: This, effectively, is the version CMP 9 voted at the end of the 1996 Code cycle. It's simple, and straightforward. It addresses genuine safety issues and nothing else. Absolutely nothing else. It doesn't substantively differ from the present requirements, but it's a lot easier to read. Now it's true that there isn't a 6 ft rule here, but there really isn't one in the 1999 NEC either. That's because present Section 110-26(f)(1)(a) Exception concludes by saying "or complies with (b)." Since (b) only requires leak protection, that's how you end up, although there's a lot of eye wash along the way. This proposal presents the straightforward version.

This topic has become a very loaded one on an emotional level. I want to take this opportunity to put it in some historical perspective for the perspective of CMP 1, which is looking at it for the first time. Since a good part of this discussion will focus on that exception, for simplicity, here it is:

Exception: Equipment that is isolated from the foreign equipment by height or physical enclosures or covers that will afford adequate mechanical protection from vehicular traffic or accidental contact by unauthorized personnel or that complies with (b), shall be permitted in areas that do not have the dedicated space described in this rule.

When the dedicated space rule first appeared in the NEC (the 1981 edition), it carried with it essentially the same exception, with one crucial difference: It only applied to "Equipment <u>located throughout industrial plants…</u>" That allowance followed this rule intact through the years until this cycle.

When CMP 9 took up this issue during the 1999 NEC comment period, the Panel decided to work from two comments on its earlier work that didn't mention any dimensions at all. One comment asked for a dedicated 6-ft zone <u>while retaining the 1996 exception intact,</u> and one suggested reorganizing the 1996 NEC requirements to tease out the foreign systems rule, but make no other substantive change.

A Panel member moved to combine the two comments, adding the dedicated 6-ft clearance to the reorganization proposal. That was the main motion. I immediately moved to amend the motion by stripping the four words "located throughout industrial plants" from the exception.

Now CMP 9 members discussed the merits of whether there was any reason other than politics to prevent other occupancies than industrials from using an allowance that had been in place for six Code cycles without reported incident. <u>Not one single member of the Panel could think of any safety reason why that should not be so.</u> Why should only industrial occupancies, some with tremendous process fluid exposures, be allowed to use drip shields? Why indeed, when a single family home had to rack a panel out from the wall just because the plumber got there first, and ran a sewer pipe past the panel location? <u>Even underneath the panel,</u> with no exceptions allowed? <u>Even with Type NM cable</u> as the wiring method, which hardly requires anything approaching 6 ft to entrain into a panel?

Not one single member of CMP 9 could think of a safety reason to vote no on the amendment, and it carried unanimously, with one abstaining vote. Subsequently, another Panel member pointed out that with the foreign system rule (b) separated from the principal rule (a), the exception had to be further amended to reference the following paragraph, and so it was. If you have the dedicated space, use it. If you don't, use the appropriate equipment or provide adequate barriers.

<u>Is there a safety issue?</u> The back and sides of electrical equipment comprise 5 sides of a rectangular solid. You can exit any one of those sides safely, although the more options you have, the better the overall design. So, what about the proverbial air duct running 2-in. above a panel? Under the present exception, could you get away with a drip shield to protect against condensation, and locate a panel at that point? Absolutely; you don't "have the dedicated space described in this rule" and thereby qualify for the exception.

Are we all going to die because you can't exit vertically in that case? I don't think so. What about a column-width panel in the webbing of a vertical I column? Horrors—two whole sides of the panel, and the back, completely obstructed! Some members of my former EC&M panel, including former CMP 1 member Bill Summers, have been in the position of having to defend enforcement of the prior version of this rule in front of a disinterested authority. The result? With no safety issue at hand, enforcement of the rule lost every time.

It gets even better when you look at medium voltage installations. Former Section 710-9, now relocated as Section 110-34(f), allows the same thing as this proposal would allow for 600V and below:

<u>(f) Protection of Service Equipment, Metal-Enclosed Power Switchgear, and Industrial Control Assemblies.</u> Pipes or ducts foreign to the electrical installation that require periodic maintenance or whose malfunction would endanger the operation of the electrical system shall not be located in the vicinity of the service equipment, metal-enclosed power switchgear, or industrial control assemblies. Protection shall be provided where necessary to avoid damage from condensation leaks and breaks in such foreign systems. Piping and other facilities shall not be considered foreign if provided for fire protection of the electrical installation.

This section actually has a longer pedigree than the rule for 600V and below, having first entered the 1975 NEC. Here again, the rule squarely addresses safety, allowing for the arrangement of field protection if necessary. This proposal avoids having more stringent rules for lower hazard work (600V and below.)

Communication is the key. Let's try to remember that we don't own the real estate. In the end the owners have to live with whatever decisions they make about sacrificing future workability on the altar of low initial costs. There are always ways, often very expensive, for you to get wiring extensions out of overly cramped electrical rooms, and done safely. I know, because I've carried tools for years and I've had to do it often.

It's our job, though, to carry this burden of communicating with other professionals. We must not ask the Code to do it for us. If we were to succeed, we'd only lose in the end, because in so doing we destroy the moral authority of a Code squarely based on minimum safety, and not the convenience of its users. Remember, other interests want to take the NEC away from our industry. Ultimately, public authorities outside our industry will make that decision. They never heard of Ohm's Law, but they'll spot something that looks and smells like an economic benefit to a special interest masquerading as a safety rule from far off.

If CMP 1 accepts this proposal, they'll just have to look somewhere else.

PANEL ACTION: Accept in Part.

PANEL STATEMENT: The panel accepts the deletion of the exception by Proposal 1-271a. The Panel chooses to retain a 6 foot dedicated space above the equipment.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #3861)

1- 276 - (110-26(f), Exception): Accept in Principle

SUBMITTER: J. Philip Simmons, Olympia, WA

RECOMMENDATION: Delete the exception that follows Section 110-26(f)(1)(a).

SUBSTANTIATION: This exception is confusing and is unnecessary as the subject of protection against accidental contact with live parts and preventing physical damage is provided in Section 110-27.

PANEL ACTION: Accept in Principle.

PANEL STATEMENT: The panel concludes that panel Proposal 1-271a meets the submitter's intent.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #1480)

1- 277 - (110-26(f)(1)(a)): Accept in Principle
SUBMITTER: Steve McNamara, FMK Electric
RECOMMENDATION: Remove text from exception "~~or that complies with (b)~~".
SUBSTANTIATION: It is not right to allow equipment in the dedicated electrical space. Six feet should be the minimum clearance height above an electrical installation. The authority having jurisdiction in the very rare case can use 90-4 to permit these installations.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel concludes that Proposal 1-271a meets the submitter's intent.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2520)

1- 278 - (110-26(f)(1)a): Reject
SUBMITTER: Richard P. Owen, City of St. Paul, MN
RECOMMENDATION: Revise as follows:
(a) Dedicated Electrical Space. The space equal to the width and depth of the equipment and extending from the floor to a height of ~~6 ft (1.83m)~~10 ft (3.05m) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, or equipment foreign to the electrical installation shall be located in this zone.
SUBSTANTIATION: The reduction of the dedicated space above equipment from 25 ft to 6 ft above the equipment made some larger equipment installations difficult, if not impossible to accomplish. To have only 6 ft above a large switchboard to install several large capacity busways from the top of the switchboard is in some cases unworkable.
Even an installation as small as a surface-mounted panelboard runs into difficulty in some cases, since the distance from the top of the panelboard to the nonstructural ceiling must be subtracted from the 6 ft space. In some installations, depending on the height of the nonstructural ceiling, it may leave very little room above the ceiling for cables, raceways, etc. to be installed in a "neat and workmanlike manner" below the ceiling, and still have enough room above the nonstructural ceiling to be able to direct these raceways or cables out to the rest of the electrical system. I think that the additional 4 ft I would propose to add to the dedicated space would allow the electricians, who are the primary focus of this Code, to install their equipment properly, but would still leave space for other trades to use the former dedicated space for their own purposes.
PANEL ACTION: Reject.
PANEL STATEMENT: The substantiation is insufficient to justify increased dedicated space as proposed.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #346)

1- 279 - (110-26(f)(1)a, Exception): Accept in Principle
SUBMITTER: Don A. Hursey, Durham City County Insp., NC
RECOMMENDATION: Delete the following:
~~Exception: Equipment that is isolated from the foreign equipment by height or physical enclosures or covers that will afford adequate mechanical protection from vehicular traffic or accidental contact by unauthorized personnel or that complies with (b), shall be permitted in areas that do not have the dedicated space described in this rule.~~
SUBSTANTIATION: The dedicated space (from the floor to a height of 6 ft (1.83 m) above the equipment or to the structural ceiling) should not include an exception that allows any foreign systems in that area. The exception (in some cases) would prohibit the electrician sufficient space for raceway installations in that area.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel concludes that Proposal 1-271a meets the submitter's intent.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #1924)

1- 280 - (110-26(f)(1)(a) Exception (New)): Reject
SUBMITTER: W. Creighton Schwan, Hayward, CA
RECOMMENDATION: Add a new exception to read as follows:
Exception: Recessed or flush panelboards.
SUBSTANTIATION: The lower plate and the doubled upper plate in conventional wood frame construction are in the dedicated space when a panelboard is installed flush with the wall finish.
This exception is necessary in order that the code recognize the common practice of mounting panelboards within walls.
PANEL ACTION: Reject.
PANEL STATEMENT: The panel believes that the double upper plate is not in the dedicated space but rather the double upper plate is the structural ceiling for that hollow wall space.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3786)

1- 281 - (110-26(f)(1)a, Exception): Reject
SUBMITTER: John I. Williamson, Minnesota Board of Electricity
RECOMMENDATION: Modify the wording in the exception in part, as follows:
Exception: Equipment that is isolated from the foreign equipment … shall be permitted in existing buildings that do not have the dedicated space described in this rule.
SUBSTANTIATION: Substantiation - For new construction, there should not be any exception to the main rules of 110-26(f)(1)(a) or (b). Careful design and planning can ensure proper dedicated workspace. However, an exception is appropriate for "existing buildings" that are renovated, whereby the exception to the main rule is offset by the overall improvements that are made to the building's electrical system. Inspection authorities all too often are expected to approve electrical installations for which a serious lack of careful design and underlying economic factors result in electrical equipment areas that are undersized. Very often these areas violate all of the requirements for working space, clear space, access and entrance to working space, and dedicated equipment space, and ultimately increase the risk of injury to personnel.
PANEL ACTION: Reject.
PANEL STATEMENT: The panel does not consider a general relaxation of the requirements for dedicated space in existing buildings is warranted. The provisions of Section 90-4 can be invoked where deemed necessary.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #333)

1- 282 - (110-26(f)(1)b): Accept in Principle
SUBMITTER: Mike Theisen, St. Cloud, MN
RECOMMENDATION: Add the word "zone" after the word "equipment" in the last sentence of this section, sentence will then read as follows:
This zone shall extend from the top of the equipment zone to the structural ceiling.
SUBSTANTIATION: If foreign systems with protection were allowed in close proximity to the top of the electrical equipment, then the dedicated electrical space required in Section 110-26(f)(1)(a) could be made unavailable.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel believes its action on Proposal 1-271a meets the intent of the submitter's substantiation.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2789)

1- 283 - (110-26(f)(1)b): Accept in Principle
SUBMITTER: Richard P. Owen, City of St. Paul, MN
RECOMMENDATION: Revise as follows:
(b) Foreign Systems. The space equal to the width and depth of the equipment shall be kept clear of foreign systems unless protection is provided to avoid damage from condensation, leaks, or breaks in such foreign systems. Any protection required by this

section shall be placed outside the dedicated space as described in 110-26(f)(1)(a). This zone shall extend from the top of the electrical equipment to the structural ceiling.
SUBSTANTIATION: This section may imply that any protection against spillage, etc. onto electrical equipment must be out of the dedicated space, but unless it is specifically stated, the arguments we have encountered would continue. I think the 6 ft dedicated space is an absolute minimum to allow electricians to install their raceways, etc. above equipment. To allow some type of "awning", "trough" or other such spillage protection within that 6 ft space makes installations difficult, if not impossible to do.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel concludes that Proposal 1-271a meets the submitter's intent.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3611)

1- 284 - (110-26(f)(1)(b)): Accept in Principle
SUBMITTER: Philip H. Cox, Int'l Assn. of Electrical Inspectors
RECOMMENDATION: Revise text to read as follows:
110-26. Spaces About Electrical Equipment. Sufficient access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment. Enclosures housing electric apparatus that are controlled by lock and key shall be considered accessible to qualified persons.
[subparagraphs (a) to (e) remain the same]
(f) Dedicated Equipment Space. Equipment within the scope of Article 384, and motor control centers, shall be located in dedicated spaces and protected from damage as covered in (1) and (2).
Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.
(1) Indoor. For indoor installations, dedicated space shall comply with the following.
a. Dedicated Electrical Space. The space equal to the width and depth of the equipment and extending from the floor to a height of 6 ft (1.83 m) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, or equipment foreign to the electrical installation shall be located in this zone.
Exception: Equipment that is isolated from the foreign equipment by height or physical enclosures or covers that will afford adequate mechanical protection from vehicular traffic, or accidental contact by unauthorized personnel or that complies with b., shall be permitted in areas that do not have the dedicated space described in this rule.
b. Foreign Systems. The ~~space~~ area above the dedicated space required by 110-26(f)(1)(a), ~~may~~ shall be permitted to contain foreign systems provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems, ~~equal to the width and depth of the equipment shall be kept clear of foreign systems unless protection is provided to avoid damage from condensation, leaks, or breaks in such foreign systems. This zone shall extend from the top of the electrical equipment to the structural ceiling.~~
c. Sprinkler Protection. Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.
d. Suspended Ceilings. A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.
(2) Outdoor. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in Section 110-26(a). No architectural appurtenance or other equipment shall be located in this zone.
SUBSTANTIATION: The wording between Sections 110-26(f)(1)(a) and 110-26(f)(1)(b) is unclear and confusing and could be in conflict with each other with the intent of the requirements. The proposed changes to the wording should clarify the confusion and potential conflict. The proposed text establishes that there is a truly dedicated space and that only that space that may exist above 6 ft above the equipment, if any, to the structural ceiling may have foreign systems installed and then only if the foreign system meets the requirement of having protection installed for the electrical equipment due to leaks, condensation or breaks.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel concludes that Proposal 1-271a meets the submitter's intent.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3122)

1- 285 - (110-26(f)(2)): Reject
SUBMITTER: John A. Hoffman, Centre Region Code Admin.
RECOMMENDATION: New additional sentence at the end of paragraph: Outdoor electrical equipment shall not be located within 10 ft of a fire department connection or a fire hydrant.
SUBSTANTIATION: This new sentence will provide fire department personnel with safe, adequate clearance to electrical equipment that is likely to be energized while connecting hose. Service equipment, pad mounted transformers, air conditioning units and like equipment can hinder the efforts of fire department personnel even though 110-26 clearances have been met. In addition, the extended clearance will afford a greater degree of safety for fire department personnel particularly during inclement weather. A similar proposal for clearance will be submitted to NFPA 13.
Note: Supporting material is available for review at NFPA Headquarters.
PANEL ACTION: Reject.
PANEL STATEMENT: While the panel is cognizant to the need for fire hydrant connection clearance, there is no substantiation that Fire Department operations are impeded or jeopardized by the presence of electrical or any other equipment in the vicinity of hose connections.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4448)

1- 286 - (110-26(g) (New)): Reject
SUBMITTER: Frants Marvin Jensen, Consolidated Engr Labs
RECOMMENDATION: Add new Section 110-26(g) as follows:
All workspace in this section shall be substantially flat and level.
Exception: Areas required to be arranged to drain.
SUBSTANTIATION: This should be self explanatory: Too many times we see panels in stairways, services on the exterior with no flat space to stand. It is very awkward to work on energized equipment while trying to keep your footing.
PANEL ACTION: Reject.
PANEL STATEMENT: It is impracticable to require all floors or platforms to be level for a number of reasons. Ramps are common in structures and, depending on the slope, do not necessarily present an impediment to the safe operation and maintenance of electrical equipment. The use of the term "substantially" as proposed is unenforceable per Section 3.2.1 of the National Electrical Code Style Manual.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2050)

1- 287 - (110-26(l)): Accept in Principle
SUBMITTER: Joel A. Rencsok, Scottsdale, AZ
RECOMMENDATION: Change Exception No. 1 and No. 3 to positive text and change Exception No. 2 to Exception to read as follows:
(1) Depth of Working Space. The depth of the working space in the direction of access to live parts shall not be less than indicated in Table 110-26(a). Distances shall be measured from the live parts if such are exposed or from the enclosure front or opening if such are enclosed.
Table 110-26(a) to remain as is now in the code with notes:
Exception: By special permission, smaller spaces shall be permitted where all uninsulated parts are at a voltage no greater than 30 volts rms, 42 volts peak, or 60 volts dc.
Working space shall not be required in back or sides of assemblies, such as dead-front switchboards or motor control centers, where

there are no renewable or adjustable parts, such as fuses or switches, on the back or sides and where all connections are accessible from locations other than the back or sides. Where rear access is required to work on de-energized parts on the back of enclosed equipment, a minimum working space of 30 in. (762 mm) horizontally shall be provided.

In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

SUBSTANTIATION: The Exception that remains is to be placed before the two added paragraphs.

There is no technical changes intended.

This will eliminate two exceptions and make the code easier to read.

PANEL ACTION: Accept in Principle.

PANEL STATEMENT: The panel understands the submitter is intending to revise Section 110-26(a)(1). The panel believes that the action on Proposal 1-252a meets the intent of the submitter.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #2746)

1- 288 - (110-27(b)): Reject

SUBMITTER: Joseph N. Fiorello, Sr., Fiorello Electric Inc.

RECOMMENDATION: Revise as follows:

(b) In locations where electrical equipment is likely to be exposed to physical damage, enclosures or guards shall be so arranged and of such strength to prevent such damage. (In an area deemed to be a flood zone by Federal or state bodies, electrical equipment shall not be installed below grade level.)

SUBSTANTIATION: During Hurricane Floyd, as an electrical inspector part of a FEMA advance team, I noted a problem of accessibility. When the emergency personnel as well as the occupants needed to shut off power they were unable to. During this time and after the waters receded, many persons were put in extremely hazardous positions not being able to turn off the power for safety.

PANEL ACTION: Reject.

PANEL STATEMENT: The proposal would not necessarily prevent the problem addressed in the substantiation. In flood zones, water can rise above grade level.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #1465)

1- 289 - (110-31): Accept in Principle

SUBMITTER: William M. Lewis, Eli Lilly and Co.

RECOMMENDATION: In Section 110-31 after second paragraph, insert:

The distance from the fence to live parts shall be not less than the following:

601 to 13799 volts	10 ft (3.05 m)
13800 to 230,000 volts	15 ft (4.57 m)
Over 230,000 volts	18 ft (5.49 m)

FPN: For clearances of conductors for specific system voltages and typical BIL ratings see National Electrical Safety Code, ANSI C2-1997.

SUBSTANTIATION: This proposal was developed by the Task Group based on the Task Group's review and discussion of the current requirements of Articles 225, 230, 100, 110, 240, and 250. This proposal is one of 14 which makes up the Task Group's response to a recommendation by a TCC task group on usability in 1995. In considering the needed proposals, emphasis was placed on including in the NEC, practices which are recognized in the electrical industry as necessary for safe installation of over 600 volt systems. This is to provide guidance and direction for installation of these facilities which have not historically been included in the NEC.

The Task Group participants consisted of William M. Lewis, (CMP 4), committee chair; Carl J. Fredericks (CMP 10); Tom Adams (CMP 4); John Beck (Chairman CMP 4); Mark Sumrall (CMP 4); Barry Hornberger, (CMP 13); William T. Beutler, P.E.; William Long, NEMA

Interested persons (nonparticipants): Robert J. Pollock (CMP 4 and TCC); Merton Bunker (NFPA); Mark Earley (NFPA)

PANEL ACTION: Accept in Principle.

Revise table to place the metric dimensions first and inch-pound units second.

PANEL STATEMENT: The dimensions are interchanged to comply with the new NEC Style Manual.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #670)

1- 290 - (110-31(a)(1)): Accept

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise first sentence: Indoor electrical installations that are ~~open~~ accessible to unqualified persons shall be made with metal-enclosed equipment. ~~or shall be enclosed in a vault or in an area to which access is controlled by a lock.~~

SUBSTANTIATION: Enclosed in a vault or controlled by a lock is considered by the first paragraph to be accessible to qualified persons only. This subsection relates to installations accessible to unqualified persons which is a different condition and the rule should apply to that condition. "In a vault or locked" is not accessible to unqualified persons. "Accessible" is defined and preferable to "open".

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #2761)

1- 291 - (110-32): Accept

SUBMITTER: Joseph A. Tedesco, Nat'l Technology Transfer, Inc.

RECOMMENDATION: Delete the words 'be adequate to" in the last sentence.

SUBSTANTIATION: The term adequate is vague and undefined, and is not supposed to be used in accordance with NEC Style Manual.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #CP105)

1- 291a - (110-33): Accept

SUBMITTER: CMP 1

RECOMMENDATION: Revise as follows;

110-33. Entrance and Access to Work Space

(A) Entrance. At least one entrance not less than 610 mm (24 in.) ~~(610 mm)~~ wide and 2.0 m (6 1/2 ft) ~~(1.98 m)~~ high shall be provided to give access to the working space about electric equipment. Where the entrance has a personnel door(s), the door(s) shall open in the direction of egress and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.

(1) Large Equipment. On switchboard and control panels exceeding 1.8 m (6)1/2 ft ~~(1.83 m)~~ in width, there shall be one entrance at each end of the equipment ~~such boards~~.

A single entrance to the required working space shall be permitted where either of the conditions in (a) or (b) are met.

(a) Unobstructed exit. Where the location permits a continuous and unobstructed way of exit travel, a single entrance to the working space shall be permitted.

~~unless the location of the switchboards and control panels permits a continuous and unobstructed way of exit travel, or unless the work space required in Section 110-34(a) is doubled.~~

(b) Extra working space. Where the depth of the working space is twice that required by 110-34(a), a single entrance shall be permitted. It shall be located so that the distance from the equipment to the nearest edge of the entrance is not less than the "Minimum Clear Distance" specified in Table 110-34(a) for equipment operating at that voltage and in that condition.

~~(2.) Where one entrance to the working space is permitted under the conditions described in (1), the entrance shall be located so that the edge of the entrance nearest the switchboards and control panels is the minimum clear distance given in Table 110-34(a) away from such equipment.~~

(2) (~~3.~~) Guarding. Where bare energized parts at any voltage or insulated energized parts above 600 volts, nominal, to ground are located adjacent to such entrance, they shall be suitably guarded.

(B) Access. Permanent ladders or stairways shall be provided to give safe access to the working space around electric equipment installed on platforms, balconies, mezzanine floors, or in attic or roof rooms or spaces.

SUBSTANTIATION: The substantiation for this Proposal CP105 is as follows:

a) The revision utilizes parallel construction to the similar requirements for under 600-volt installations as recommended in the Style Manual Section 3.3.5.

b.) Incorporate metric changes.

c.) Retained the soft metric conversion of 24 inches equals 610 mm in Section 110-33(a) for safety reasons to avoid reducing the opening to the required workspace.

d.) Incorporated some of the material from Proposals 1-292, 1-293, 1-294 and 1-295.

e.) The panel recognizes that the safety of workers who are exposed to energized conductors is of great concern. The revision will limit the application of the requirement for panic hardware to personnel doors to workspaces where doors are provided.

PANEL ACTION: Accept.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2889)

1- 292 - (110-33(a)): Accept in Principle
SUBMITTER: James Maldonado, City of Tempe, AZ/Rep. Central Arizona Chapter IAEI
RECOMMENDATION: Section 110-33(a) add new paragraph at the end of this section to read as follows:

All rooms or spaces as described in Section 110-34(a), dedicated to electric equipment, shall have all doors open outward. Such doors shall be a minimum of 24 in. (610 mm) wide and 6-1/2 ft (1.98m) high).

SUBSTANTIATION: Electrical equipment less than 1200 amps does not require any specific size of access and entrance to working space. There is also no requirement to be able to exit the working space after a person enters. If an emergency occurs, there will not be adequate access for emergency teams. If the entrance or access door opens inward and slows down emergency egress during a fault the severity of burns and bodily injury a person may receive is directly related to the distance a person is away from the faulting equipment. An inward opening door restricts that exiting speed and increases the possibility of more severe injuries.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: See Proposal 1-291a. The panel does not agree with the submitter's substantiation contained in the first sentence.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2890)

1- 293 - (110-33(a)): Reject
SUBMITTER: James Maldonado, City of Tempe, AZ/Rep. Central Arizona Chapter IAEI
RECOMMENDATION: Add a new paragraph at the end of Section 110-33(a) to read as follows:

For electric equipment having hinged doors or panels, a clear means of egress shall be provided when doors or panels are open in any position. Such means of egress shall not be less than 24 in. (610mm) in width.

SUBSTANTIATION: This requirement allows for emergency egress from electrical equipment when the door or panels block the means of access or egress. Since 24 in. is required as a means of access it is unclear when this clearance is required, with or without the doors open. There have been many times equipment has been installed close to walls or other equipment that when the doors are open the access and egress space is reduced or eliminated. This clear path is essential during emergencies.
PANEL ACTION: Reject.
PANEL STATEMENT: The submitter has not provided any technical substantiation to warrant increasing the workspace beyond that required in Section 110-34. See panel action and panel statement on Proposal 1-291a.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3847)

1- 294 - (110-33(a)): Accept in Principle
SUBMITTER: Lanny McMahill, Phoenix, AZ
RECOMMENDATION: Add the following text:

Entrance doors shall open outward from the working space.

SUBSTANTIATION: The possibility of a door opening into a working space can create a potential unsafe condition for service personnel. Requiring the doors to open outward from the working space eliminates this problem.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: See the Proposal 1-291a. The panel believes this action addresses the concern of the submitter.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4474)

1- 295 - (110-33(a)): Reject
SUBMITTER: Glenn Soles, Clark County Building Dept., NV/Rep. Southwestern Section IAEI
RECOMMENDATION: Add a new paragraph at the end of Section 110-33(a) to read as follows:

"For electric equipment having hinged doors or panels, a clear means of egress shall be provided when doors or panels are open in any position. Such means of egress shall not be less than 24 in. (610 mm) in width."

SUBSTANTIATION: This requirement allows for emergency egress from electrical equipment when the door or panels block the means of access or egress. Since 24 in. is required as a means of access it is unclear when this clearance is required, with or without the doors open. There have been many times equipment has been installed close to walls or other equipment that when the doors are open the access and egress space is reduced or eliminated. This clear path is essential during emergencies.
PANEL ACTION: Reject.
PANEL STATEMENT: The submitter has not provided any technical substantiation to warrant increasing the workspace beyond that required in Section 110-34. See Proposal 1-291a.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3259)

1- 296 - (110-34): Reject
SUBMITTER: Alan Manche, Square D Co.
RECOMMENDATION: Revise NEC 110-34 with the additions (underlined) and deletions (strike through) as shown. The entire text of 110-34 and 110-34(a) is shown for clarity, but only those changes shown underlined or strike through are part of this proposal.

110-34. Work Space and Guarding. Sufficient access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment.

(a) Working Space. Except as elsewhere required or permitted in this Code, equipment likely to require examination, adjustment, servicing, or maintenance while energized shall have ~~the minimum~~ clear working space in the direction of access to live parts of the electrical equipment and shall not be less than specified in Table 110-34(a). Distances shall be measured from the live parts, if such are exposed, or from the enclosure front or opening if such are enclosed.

SUBSTANTIATION: The proposal accomplishes the objective of providing some consistency with 110-26. The first change indicates that you have to have sufficient access and space about all electrical equipment to allow it to be operated.

The revision in (a) parallels the requirement in 110-26(a) that "working space" is required where the equipment might be adjusted, maintained, examined or serviced while energized. The presently language could be interpreted to require "working space" about any piece of >600V equipment regardless of whether it might be worked on while energized. This view would seem to be counter to the stated need that the working space is determine based on access to live parts.
PANEL ACTION: Reject.
PANEL STATEMENT: The proposed intoductory text added to 110-34 is presently contained in Section 110-32. The submitter has not provided substantiation to support the proposed recommendation in Section 110-34(a).
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #448)

1- 297 - (Table 110-34(a)): Accept
SUBMITTER: Technical Correlating Committee National Electrical Code
RECOMMENDATION: Revise Table 110-34(a) to read as follows:

~~*Table 110-34(a) Minimum Depth of Clear Working Space at Electrical Equipment*~~

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
601-2500 V	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)
2501-9000 V	1.2 m (4 ft)	1.5 m (5 ft)	1.8 m (6 ft)
9000-25,000 V	1.5 m (5 ft)	1.8 m (6 ft)	2.8 m (9 ft)
25,001 – 75 kV	1.8 m (6 ft)	2.5 m (8 ft)	3.0 m (10 ft)
Above 75 kV	2.5 m (8 ft)	3.0 m (10 ft)	3.7 m (12 ft)

Note: Where the conditions are as follows:

Conditions 1, 2 and 3 remain unchanged.

SUBSTANTIATION: The proposed revision is intended to comply with the NFPA No. 1M Manual of Style Section 4.1 with respect to the placement of units and values of measurement, i.e., show the SI units as the preferred and inch-pound units immediately following in parenthesis.
PANEL ACTION: Accept.
PANEL STATEMENT: Editorially revise proposed table to replace 9000 -25,000 V with 9001-25,000 V to match Table 110-34(a) from the 1999 NEC.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4281)

1- 298 - (Table 110-34(a)): Reject
SUBMITTER: Sukanta Sengupta, FMC Corp.
RECOMMENDATION: Add a new Note 2 and Change existing Note 2 to Note 3.
Note 2. The minimum clearence distance indicated in Table shall be increased to permit at least a 90 degree opening of hinged equipment doors or hinged panels.
SUBSTANTIATION: This change will prevent hinged doors or hinged panels to touch an equipment on the opposite side. Which may become a safety hazard.
PANEL ACTION: Reject.
PANEL STATEMENT: The proposed requirement presently exists in Section 110-32 and would be redundant as a note to the table.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4342)

1- 299 - (Table 110-34(a)): Reject
SUBMITTER: Sukanta Sengupta, FMC Corp.
RECOMMENDATION: Revise the first line of Condition 1
Exposed live parts on one side and exposed live parts on on opposite side of working space effectively guarded by insulating materials, or exposed live parts on both sides effectively guarded by insulating materials.
SUBSTANTIATION: This revision will give a clear picture of an installation.
Wood insulation is an insulating material. Why mention it as a seperate item?
PANEL ACTION: Reject.
PANEL STATEMENT: The present text is clear and the proposal represents a misunderstanding of the requirements.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2098)

1- 300 - (Table 110-34(a) Note): Reject
SUBMITTER: Joel A. Rencsok, Scottsdale, AZ
RECOMMENDATION: Add at the start of each Condition before the words (exposed live parts) the following words (the enclosure or)
Condition 1 — The enclosure or exposed live parts on one side and no live or grounded parts on the other side of the working space, or the enclosure or exposed live parts on both sides effectively guarded by suitable wood or other insulating materials. Insulated wire or insulated busbars operating at not over 300 volts to ground shall not be considered live parts.
Condition 2 — The enclosure or exposed live parts on one side and grounded parts on the other side. Concrete, brick, or tile walls shall be considered as grounded.
Condition 3 — The enclosure or exposed live parts on both sides of the work space (not guarded as provided in Condition 1) with the operator between.
SUBSTANTIATION: The main section refers to the enclosure but the conditions do not.
By adding these words will correlate the main requirement to the conditions.
This will make the notes more understandable.
Appears that the intent is to require the enclosure to the conditions but does not state in conditions.
PANEL ACTION: Reject.
PANEL STATEMENT: The panel concludes that the additional wording does not add clarity to the requirements.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #671)

1- 301 - (110-34(b), (c)): Reject
SUBMITTER: Dan Leaf, Palmdale, CA
RECOMMENDATION: Revise to read as follows:
(b) Separation from Low-voltage Equipment. Where switches, cutouts, or other equipment operating at 600 volts, nominal, or less, are installed in a room or enclosure where there are exposed live parts or exposed conductors ~~wiring~~ operating at over 600 volts, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the low-voltage equipment by a suitable partition, fence, or screen.
Exception: Switches or other equipment operating at 600 volts, nominal, or less, and serving only the high-voltage equipment ~~within the high-voltage vault, room, or enclosure,~~ shall be permitted ~~to be installed in the high-voltage room, or vault operating at over 600 volts, nominal,~~ without a partition, fence or screen if accessible to qualified persons only.
(c) Locked Rooms or Enclosures. The entrance(s) to all ~~buildings,~~ vaults, rooms, or other enclosures containing live parts or exposed conductors operating at over 600 volts, nominal, shall be kept locked, access being allowed only to qualified persons, unless such entrance(s) is ~~are~~ under the observation of a ~~qualified~~ person authorized to forbid entry, at all times.

SUBSTANTIATION: In (b) exposed wiring could apply to over 600 volt conductors in surface-mounted rigid metal conduit, which in general would not require special separation or isolation. Subsection (c) references exposed conductors.

The rule of (b) permits low-voltage equipment if separation is provided whether or not serving only high-voltage equipment and doesn't deny access to unqualified persons since the partitioned area is required to be locked per (c). The exception literally nullifies the rule by requiring a relation between low- and high-voltage equipment and limiting access to qualified persons even where separation is provided since it is not based on a condition such as the omission of the partition, which seems to be the intent. The multiple references in the exception to the high-voltage enclosure are superfluous as it is stated in the rule.

In (c) the literal wording broadly requires all building entrances to be kept locked even where the equipment room comprises only a small part of the building. The definition of enclosure indicates fences, walls, etc., for a particular purpose. The proposed addition for (c) specifies obvious access requirements for qualified persons and deletes requirement for a qualified person since a security guard, for example, should not have to meet Article 100 definition of qualified person.

PANEL ACTION: Reject.

PANEL STATEMENT: The panel appreciates the submitter's complete subsection and exception text recommendation using strikethrough for recommended text deletion and underlining for recommended text addition. However, several key words were both omitted and added without benefit of strikethrough and underline identification. As several of the omitted and added words are key to the requirements, the panel was uncertain as to the submitter's intent.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #3260)

1- 302 - (110-34(c)): Reject

SUBMITTER: Alan Manche, Square D Co.

RECOMMENDATION: Revise the second paragraph of 110-34(c) with the additions (underlined) and deletions (strike through) as shown. The entire text of paragraph is shown for clarity, but only those changes shown underlined or strike through are part of this proposal.

Where the voltage exceeds 600 volts, nominal, permanent and conspicuous warning signs shall be provided~~, reading as follows:~~ <u>with the following words or equivalent.</u>

DANGER - HIGH VOLTAGE - KEEP OUT

SUBSTANTIATION: The explicit nature of the present wording is causing field problems in the acceptance of appropriate warning signs or markings. The ANSI Z535 series of standards provides the proper procedure in establishing a hazard sign or marking. ANSI Z535.4 provides the information about what should be contained in a hazard sign or label. This includes a message panel that identifies the hazard, indicates how to avoid the hazard and advises the probable consequence of not avoiding the hazard. The objective of the NEC wording is to generally convey the basic message requirement to user. However, in order to comply with Z535.4, the exact words stated in the NEC may not be appropriate for the contemplated circumstances. Revising the text to allow "or equivalent" would allow a hazard sign to comply with the NEC, but be formated in accordance with Z535.4.

PANEL ACTION: Reject.

PANEL STATEMENT: The term "equivalent" is vague, subjective and can lead to misleading words intended to identify a possible hazard. Refer to the new NEC Style Manual, Section 3.2.1.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #3783)

1- 303 - (110-34(c)): Reject

SUBMITTER: Jack H. Zewe, Electrical Consultants, Inc.

RECOMMENDATION: Revise section 110-34 c, warning sign requirements.

Old Text: Danger- High Voltage – Keep Out

Proposed Text: Danger-Hazardous Voltage - Unqualified Personnel - Keep Out

SUBSTANTIATION: Present wording does not reflect the requirements of OSHA Electrical Safe Work Practices. The present wording implies that the person viewing the warning sign would or should have know what "High Voltage" is. High Voltage is a relative term and may mean something different to manny people. OSHA requires warnign signs that tell a person of a HAZARD and WHAT to DO. If you take the present Warning Sign language literaly, no one could work in or proceed pass a sign that states, Warning- Keep Out. There are no exceptions that follwing the present sign requirements. Electrical Workers violate this Keep Out warning every day.

PANEL ACTION: Reject.

PANEL STATEMENT: The proposed wording is not mandated by OSHA. The present wording adaquately identifies the hazard involved.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #449)

1- 304 - (Table 110-34(e)): Accept in Principle

SUBMITTER: Technical Correlating Committee National Electrical Code

RECOMMENDATION: Revise Table 110-34(e) to read as follows. (Table shown below)

Table 110-34(e). Elevation of Unguarded Live Parts Above Working Space

Nominal Voltage Between Phases	Elevation
601-7500 V	2.5 m (8 1/2 ft)
7501-35,000 V	2.8 m (9 ft)
Over 35 kV	<u>2.8 m + 9.5 mm/kV above 35</u> (9 ft + 0.37 in./kv above 35)

SUBSTANTIATION: The proposed revision is intended to comply with the NFPA No. 1M Manual of Style Section 4.1 with respect to the placement of units and values of measurement, i.e., show the SI units as the preferred and inch-pound units immediately following in parenthesis.
PANEL ACTION: Accept in Principle.
Revise Table 110-34(e) to read as follows:

Table 110-34(e). Elevation of Unguarded Live Parts Above Working Space

Nominal Voltage Between Phases	Elevation
601-7500 V	2.8 m (9 ft)
7501-35,000 V	2.9 m (9 1/2 ft)
Over 35 kV	2.9 m + 9.5 mm/kV above 35 (9 1/2 ft + 0.37 in./kv above 35)

PANEL STATEMENT: The panel has accepted the metric additions to this table. The panel has also accepted the revisions to increase the dimensions from Proposal 1-305. Both of these proposals are incorporated in the revised Table 110-34(e) .
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #1466)

1- 305 - (Table 110-34(e)): Accept in Principle
SUBMITTER: William M. Lewis, Eli Lilly and Co.
RECOMMENDATION: Change the 8 ft 6 in. to 9 ft and the 9 ft to 9 ft 6 in. in two places.
SUBSTANTIATION: For consistency with Table 124-1 of the NESC.
This proposal was developed by the Task Group based on the Task Group's review and discussion of the current requirements of Articles 225, 230, 100, 110, 240, and 250. This proposal is one of 14 which makes up the Task Group's response to a recommendation by a TCC task group on usability in 1995. In considering the needed proposals, emphasis was placed on including in the NEC, practices which are recognized in the electrical industry as necessary for safe installation of over 600 volt systems. This is to provide guidance and direction for installation of these facilities which have not historically been included in the NEC.
The Task Group participants consisted of William M. Lewis (CMP 4), committee chair; Carl J. Fredericks (CMP 10); Tom Adams (CMP 4); John Beck (Chairman CMP 4); Mark Sumrall (CMP 4); Barry Hornberger, (CMP 13); William T. Beutler, P.E.; William Long, NEMA
Interested persons (nonparticipants): Robert J. Pollock (CMP 4 and TCC); Merton Bunker (NFPA); Mark Earley (NFPA)
PANEL ACTION: Accept in Principle.
Add metric dimensions as follows:
Change the 8 ft 6 in. to 2.8 m (9 ft) in one place and the 9 ft to 2.9 m (9 ft 6 in.) in two places.
PANEL STATEMENT: Editorially add metric dimensions to the dimensions in this proposal. The panel believes that the intent of the submitter was to increase the dimensions in all three rows of the table. See Proposal 1-304 for actual table revisions.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2448)

1- 306 - (110-34(f)): Reject
SUBMITTER: John A. Hoffman, Centre Region Code Admin.
RECOMMENDATION: Revise as follows:
Pipes or ducts foreign to the electrical installation that require periodic maintenance or whose malfunction would endanger the operation of the electrical system shall not be located within 20 ft extending in all directions from service equipment, metal enclosed power switchgear, or industrial assemblies. This zone shall extend from the floor to the structure ceiling.
SUBSTANTIATION: The wording in the 1999 edition states that pipes or ducts foreign to the electrical installation shall not be located "in the vicinity" of the service equipment, metal enclosed power switchgear or industrial control assemblies. This wording is too ambiguous for inspectors to use. It calls on the inspector to make a determination of an acceptable clearance which is not enforced unilaterally nationwide. If the inspector errs in their judgement of an acceptable clearance (5 ft, 8 ft, 10 ft). Failure of piping systems could produce catastrophic results for which he or she could now be held liable. The change affords a standard for the inspector to use as an acceptable clearance.
PANEL ACTION: Reject.
PANEL STATEMENT: The proposal is considered too restrictive and the panel prefers the performance language as presently contained in Section 110-34(f).
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #4447)

1- 307 - (110-34(g) (New)): Reject
SUBMITTER: Frants Marvin Jensen, Consolidated Engr Labs
RECOMMENDATION: Add new Paragraph (g) as follows:
All workspace in this section shall be substantially flat and level.
Exception: Areas required to be arranged to drain.
SUBSTANTIATION: This should be self explanatory: Too often we see switchyards with the required clearances built into a hillside but no footing or place to stand in front of the equipment, especially when using a "hot stick."
PANEL ACTION: Reject.
PANEL STATEMENT: It is impracticable to require all floors or platforms to be level for a number of reasons. Ramps are common in structures and, depending on the slope, do not necessarily present an impediment to the safe operation and maintenance of electrical equipment. The use of the term "substantially" as proposed is unenforceable per Section 3.2.1 of the National Electrical Code Style Manual.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #3859)

1- 308 - (110 Part D): Accept
NOTE: The Technical Correlating Committee rejects the panel action to move the material noting that it is outside the Scope of Article 490. It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 13 for information.
SUBMITTER: J. Philip Simmons, Olympia, WA
RECOMMENDATION: Move Part D of Article 110 to be Part E of Article 490.
Renumber existing Part E of Article 490 to Part F.
SUBSTANTIATION: It seems Part D of Article 110 belongs in Article 490 for the following reasons:
1. Article 110 generally applies to all electrical installations.
2. The present Part D of Article 110 applies to a very narrow class of installation.
3. Article 490 applies to the over 600 volt equipment class of installation covered in existing Part D of Article 110.

4. Existing Part D of Article 490 covers the closely related "Mobile and Portable Equipment." Note the following text from Section 490-51(a) indicating what is covered in Part D: "(a) Covered. The provisions of this part shall apply to installations and use of high-voltage power distribution and utilization equipment that is portable or mobile, or both, such as substations and switch houses mounted on skids, trailers, or cars; mobile shovels; draglines; cranes; hoists, drills; dredges; compressors; pumps; conveyors; underground excavators; and the like."

5. Compare what is covered in Part D of Article 490 with the following text from Section 110-51(a) indicating what is covered in Part D of Article 110 and note the similarity: "(a) Covered. The provisions of this part shall apply to installation and use of high-voltage power distribution and utilization equipment that is portable and/or mobile, such as substations, trailers, or cars, mobile shovels, draglines, hoists, drills, dredges, compressors, pumps, conveyors, underground excavators, and the like."

6. Locating the text from Part D of Article 110 in Article 490 will improve the organization and user-friendliness of the Code.

PANEL ACTION: Accept.

PANEL STATEMENT: The panel agrees with the submitter that this material is more appropriate for CMP-13. CMP-1 recognizes that relocating Part D. Tunnel Installations Over 600 Volts, Nominal is under the purview of the TCC. Refer to CMP-13 for comment.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #672)

1- 309 - (110-51(a), FPN (New)): Reject

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Add a fine print note to 110-51(a) to read as follows:

FPN: See Section 90-2(b)(2) for installatons not covered by this code.

SUBSTANTIATION: Editorial. Code users may easily overlook the provisions of Section 90-2(b)(2) where focused on this section.

PANEL ACTION: Reject.

PANEL STATEMENT: There are many locations in the Code where a reference to the scope might be made. However, the value added by such references is minimal for the "trained person" contemplated in Section 90-1.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

NOT RETURNED: 1 Macias

(Log #7)

1- 310 - (110-58): Accept in Principle

NOTE: The following proposal consists of Comment 1-295 on Proposal 1-271 in the 1998 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 1999 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 1-271 was:

The Technical Correlating Committee has agreed that this proposal be submitted to the panel as a public proposal.

A. Move the following text from Article 710 into Article 110, Part B and place as appropriate.

~~710 32.~~ 110-XX. Circuit Conductors. [move to Article 110, Part B.]

Circuit conductors shall be permitted to be installed in raceways, in cable trays, as metal-clad cable, as bare wire, cable, and busbars, or as Type MV cables, or conductors as provided in Sections ~~710 4 through 710 6~~ 300-XX through 300-XX. Bare live conductors shall conform with Sections ~~710 33 and 710 34~~ 110-XX and 110-XX.

Insulators, together with their mounting and conductor attachments, where used as supports for wires, single-conductor cables, or busbars, shall be capable of safely withstanding the maximum magnetic forces that would prevail when two or more conductors of a circuit were subjected to short-circuit current.

Open runs of insulated wires and cables having a bare lead sheath or a braided outer covering shall be supported in a manner designed to prevent physical damage to the braid or sheath. Supports for lead-covered cables shall be designed to prevent electrolysis of the sheath.

~~710 33.~~ 110-XX. Minimum Space Separation. [move to Article 110, Part B.]

In field-fabricated installations, the minimum air separation between bare live conductors and between such conductors and adjacent grounded surfaces shall not be less than the values given in Table ~~710 33~~ 110-XX. These values shall not apply to interior portions or exterior terminals of equipment designed, manufactured, and tested in accordance with accepted national standards.

Table ~~710 33.~~ 110-XX. Minimum Clearance of Live Parts*

Nominal Voltage Rating, kV	Impulse Withstand, B.I.L. kV		Minimum Clearance of Live Parts, in Inches			
			Phase-to-Phase		Phase-to-Ground	
	Indoors	Outdoors	Indoors	Outdoors	Indoors	Outdoors
2.4-4.16	60	95	4.5	7	3.0	6
7.2	75	95	5.5	7	4.0	6
13.8	95	110	7.5	12	5.0	7
14.4	110	110	9.0	12	6.5	7
23	125	150	10.5	15	7.5	10
34.5	150	150	12.5	15	9.5	10
46	200	200	18.0	18	13.0	13
69		200		18		13
115		250		21		17
138		250		21		17
161		350		31		25
230		550		53		42
		550		53		42
		650		63		50
		650		63		50
		750		72		58
		750		72		58
		900		89		71
		1050		105		83

For SI units: 1 in. = 25.4 mm.

*The values given are the minimum clearance for rigid parts and bare conductors under favorable service conditions. They shall be increased for conductor movement or under unfavorable service conditions or wherever space limitations permit. The selection of the associated impulse withstand voltage for a particular system voltage is determined by the characteristics of the surge protective equipment.

B. Move the following text from Article 710, Part F into Article 110, as a new Part and place as appropriate.

~~F.~~ X. Tunnel Installations, Over 600 Volts, Nominal

~~710-51.~~ 110-XX. General.

(a) Covered. The provisions of this part shall apply to installation and use of high-voltage power distribution and utilization equipment that is portable and/or mobile, such as substations, trailers, or cars, mobile shovels, draglines, hoists, drills, dredges, compressors, pumps, conveyors, underground excavators, and the like.

(b) Other Articles. The requirements of this part shall be additional to, or amendatory of, those prescribed in Articles 100 through ~~710~~ 490 of this Code. Special attention shall be paid to Article 250.

(c) Protection Against Physical Damage. Conductors and cables in tunnels shall be located above the tunnel floor and so placed or guarded to protect them from physical damage.

~~710-52.~~ 110-XX. Overcurrent Protection.

Motor-operated equipment shall be protected from overcurrent in accordance with Article 430. Transformers shall be protected from overcurrent in accordance with Article 450.

~~710-53.~~ 110-XX. Conductors.

High-voltage conductors in tunnels shall be installed in (1) metal conduit or other metal raceway, (2) Type MC cable, or (3) other approved multiconductor cable. Multiconductor portable cable shall be permitted to supply mobile equipment.

~~710-54.~~ 110-XX. Bonding and Equipment Grounding Conductor.

(a) Grounded and Bonded. All noncurrent-carrying metal parts of electric equipment and all metal raceways and cable sheaths shall be effectively grounded and bonded to all metal pipes and rails at the portal and at intervals not exceeding 1000 ft (305 m) throughout the tunnel.

(b) Equipment Grounding Conductor. An equipment grounding conductor shall be run with circuit conductors inside the metal raceway or inside the multiconductor cable jacket. The equipment grounding conductor shall be permitted to be insulated or bare.

~~710-55.~~ 110-XX. Transformers, Switches, and Electric Equipment.

All transformers, switches, motor controllers, motors, rectifiers, and other equipment installed below ground shall be protected from physical damage by location or guarding.

~~710-56.~~ 110-XX. Energized Parts.

Bare terminals of transformers, switches, motor controllers, and other equipment shall be enclosed to prevent accidental contact with energized parts.

~~710-57.~~ 110-XX. Ventilation System Controls.

Electrical controls for the ventilation system shall be so arranged that the airflow can be reversed.

~~710-58.~~ 110-XX. Disconnecting Means.

A switching device meeting the requirements of Article 430 or 450 shall be installed at each transformer or motor location for disconnecting the transformer or motor. The switching device shall open all ungrounded conductors of a circuit simultaneously.

~~710-59.~~ 110-XX. Enclosures.

Enclosures for use in tunnels shall be dripproof, weatherproof, or submersible as required by the environmental conditions. Switch or contactor enclosures shall not be used as junction boxes or raceways for conductors feeding through or tapping off to other switches, unless special designs are used to provide adequate space for this purpose.

~~710-60.~~ 110-XX. Grounding.

Tunnel equipment shall be grounded in accordance with Article 250.

SUBMITTER: Dan Leaf, Palmdale, CA
RECOMMENDATION: Accept in principle revised as follows:

110-58. Disconnecting Means. A ~~switching device meeting the requirements of Articles 430 or 450~~ switch or circuit breaker that simultaneously opens all ungrounded conductors of the circuit shall be installed at each transformer or motor location for disconnecting the transformer or motor. The switching device shall open all ungrounded conductors of a circuit simultaneously. The switch or circuit breaker for a motor shall comply with the requirements of Article 430. The switch or circuit breaker for a transformer shall have an ampere rating not less than the ampacity of the transformer supply conductors.

SUBSTANTIATION: Editorial. Article 450 does not appear to have requirements for transformer primary disconnecting means. This comment indicates switches and circuit breakers in case the Panel intent is not to include all types of switching devices such as contactors.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: The panel believes that the action on Proposal 1-311 meets the intent of the submitter.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #673)

1- 311 - (110-58): Accept in Principle
SUBMITTER: Dan Leaf, Palmdale, CA
RECOMMENDATION: Revise to read as follows:

Disconnecting Means. A ~~switching device~~ switch or circuit breaker which simultaneously opens all ungrounded conductors of the circuit ~~meeting the requirements of Article 430 or 450~~ shall be installed (within sight of) (immediately adjacent to) each transformer or motor location for disconnecting the transformer or motor. The switch or circuit breaker for a transformer shall have an ampere rating not less than the ampacity of the transformer supply conductors. The switch or circuit breaker for a motor shall comply with the applicable requirements of Article 430. ~~The switching device shall open all ungrounded conductors of a circuit simultaneously.~~ (alternate choices in parenthesis.)

SUBSTANTIATION: A switch or circuit breaker is proposed as the switching device as they can normally be operated at their location, whereas a switching device such as a contactor remotely controlled can literally comply. Article 450 does not appear to have requirements for transformer primary disconnecting means.
PANEL ACTION: Accept in Principle.
Revise to read as follows:

Disconnecting Means. A ~~switching device~~ switch or circuit breaker which simultaneously opens all ungrounded conductors of the circuit ~~meeting the requirements of Article 430 or 450~~ shall be installed within sight of each transformer or motor location for disconnecting the transformer or motor. The switch or circuit breaker for a transformer shall have an ampere rating not less than the ampacity of the transformer supply conductors. The switch or circuit breaker for a motor shall comply with the applicable requirements of Article 430. ~~The switching device shall open all ungrounded conductors of a circuit simultaneously.~~"

PANEL STATEMENT: The panel chose the language "within sight of" as the prefered language from the recommendation.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias

(Log #2762)

1- 312 - (110 Part E (New)): Reject
SUBMITTER: Joseph A. Tedesco, Nat'l Technology Transfer, Inc.
RECOMMENDATION: Relocate Part D from Article 370 to become a new Part E in Article 110.
SUBSTANTIATION: This information should be in Article 110, instead of Article 370.
PANEL ACTION: Reject.
PANEL STATEMENT: The subject material is more appropriate in Article 370 than in Article 110.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 13
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12
NOT RETURNED: 1 Macias
