

ARTICLE 215 — FEEDERS

(Log #2868)

2- 237 - (215): Reject

SUBMITTER: Gary Wright, Master Electrical Contractors Inc.
RECOMMENDATION: Revise text to read as follows:

Each ungrounded conductor shall be identified according to phase (i.e. A, B, C). 120/240V nominal shall be identified as black, red, blue, 480 volt nominal shall be identified as brown, orange, yellow. Conductors shall be permanently identified with a continuous outer sheath or with tape or with other permanent means.

SUBSTANTIATION: The primary reason for this proposal is to establish a uniform code with which to identify the ungrounded conductor and phase thereby eliminating potential hazards of misidentification. Thus creating a safer work environment. The realistic potential of these hazards exists because of the diversity within the industry.

PANEL ACTION: Reject.

PANEL STATEMENT: Proper voltage testing and circuit tracing techniques cannot be safely replaced by a color code.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 11

NEGATIVE: 1

EXPLANATION OF NEGATIVE:

MERICLE: I vote no on the Panel Action. I agree with the submitter in his recommendation except that I believe the new text should read "277/480V", not just 480 volts. In past code cycles, there have been several proposals like this one and it appears there is a substantial amount of interest to use this color coding. The northeast has used and continues to use this identification with success. If it were mandated by the NEC the electrical industry would be a safer place to work. Color coding alone should not replace proper testing procedures, but it would alert an electrician that 277/480 is present. I realize that some industries, states and municipalities may have their own means of identification but with electricians traveling all over the country we would show consistency throughout.

(Log #4352)

2- 238 - (215-2, FPN No. 2): Reject

SUBMITTER: R. Gerald Irvine, Suffern, NY

RECOMMENDATION: Change FPN No. 2 to a requirement by inserting "shall be" before "sized" and deleting all after "5 percent" in the first sentence.

SUBSTANTIATION: Voltage drop limitations are necessary for proper equipment operation and for conservation of energy by reducing excessive line losses. ASHRAE (IESNA 90.1R Energy Conservation in New Buildings) also contains voltage drop limitations.

PANEL ACTION: Reject.

PANEL STATEMENT: Percentage of voltage drop is a design consideration based on conductor size, loading, and other factors.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #1021)

2- 239 - (215-2, FPN No. 4, No. 5, and No. 6 (New)): Reject

SUBMITTER: Charles W. Algood, A&A Electric Services Inc./Rep. L.U. 915 I.B.E.W.

RECOMMENDATION: Add FPN No. 4, No. 5, and No. 6 to read as follows:

FPN No. 4: See Section 310-10 for temperature limitations of conductors.

FPN No. 5: See Section 110-14(c) for temperature limitations of conductors.

FPN No. 6: See Section 310-15 for ampacity ratings of conductors.

SUBSTANTIATION: Two of these proposed FPNs are already present in Section 210-19(a). Since both sections address the selection of the correct conductors to carry noncontinuous and continuous loads, it is only good common sense that they also appear in Section 215-2.

The proposed FPN No. 5 is a "UL Greenbook", requirement on terminations, and is an essential factor in determining the correct

conductor and its application at points of termination, and the use of higher temperature rated conductors.

PANEL ACTION: Reject.

PANEL STATEMENT: The addition of the fine print note does not improve usability.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #3150)

2- 240 - (215-2, Exception): Reject

SUBMITTER: Aaron Emmendorfer, O.S.C. Electric

RECOMMENDATION: Delete the exception.

SUBSTANTIATION: This section deals with feeder wire sizing, not overcurrent protection of feeders. Current is current whether the overcurrent device is rated for 100 percent operation or not. This rule should be the same in all cases.

PANEL ACTION: Reject.

PANEL STATEMENT: Deletion of the exception would require that the conductor be sized at 125 percent of the continuous load when the overcurrent protection is listed for operation at 100 percent.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #393)

2- 241 - (215-2(a)): Reject

SUBMITTER: Glenn W. Zieseniss, Crown Point, IN

RECOMMENDATION: Add the following to the last sentence of the paragraph:

"and where adjustment or correction factors are applied, the ampacity of the conductor shall not be less than 100 percent of the noncontinuous load plus 100 percent of the continuous load."

SUBSTANTIATION: The existing text seems to imply that is a "stand alone" statement and other NEC sections, such as the first paragraph of 240-3 and 240-3(d), do not apply if the ampacity of the conductor was greater than or equal to 125 percent of the continuous load plus 100 percent of the noncontinuous load before applying any adjustment or correction factors. There is no text to indicate the minimum conductor ampacity required after any adjustment or correction factors are applied. It is possible for the calculated conductor ampacity to be less than 100 percent of the continuous and noncontinuous loads after adjustment and correction factors are applied.

PANEL ACTION: Reject.

PANEL STATEMENT: The first sentence of 215-2(a) provides the text that establishes the minimum conductor ampacity by stating that it shall not be less than the load to be served.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #688)

2- 242 - (215-2(a)): Accept in Part

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

(a) General. Feeder conductors shall have an ampacity not less than required to supply the load as computed in Parts B, C, and D of Article 220. The minimum feeder conductor size before the application of any adjustment or correction factors, shall have an allowable ampacity ~~equal to or greater~~ not less than the noncontinuous load (s), plus 125 percent of the continuous load (s) or the ampacity specified for motor supply conductors in (Sections 430-22; 430-24; 430-25; 430-28; 440-32; 440-33; 440-34; and 440-35.) (Part B of Article 430 and Part D of Article 440.) whichever is greater.

(alternate choices in parentheses)

Exception No. 1: The correction factors for temperatures below 26°C (78°F) shall be permitted in determining the initial conductor ampacity.

Exception No. 2: Where the assembly, including any integral the overcurrent device(s) supplying protecting the feeder(s) is listed for operation at 100 percent of its rating, the ampacity of the feeder conductors shall be permitted to be not less than the sum of the noncontinuous load(s) ~~plus~~ and the continuous load(s),

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plus the ampacity specified for motor supply conductors in (Sections 430-22; 430-24; 430-25; 430-28; 440-32; 440-33; 440-34; and 440-35.) (Part B of Article 430 and Part D of Article 440.)

(Alternate choices in parentheses)

Additional minimum sizes shall be as specified in (b), (c), and (d) under the conditions stipulated.

SUBSTANTIATION: Application of this section and Chapter 4 to the same noncontinuous, continuous, and motor loads can result in disparity between conductor sizes. Does Chapter 2 or 4 prevail? The examples I have provided indicate possible disparity.

The panel statement for Comment 1-174 in the 1998 ROC indicated motor loads continuing for three hours or more are not excluded from the definition of continuous load. This may be literally true but not in accordance with Articles 430 and 440 and common practice. Chapter 4 only requires the 125 percent factor for the largest motor (regardless of operating time), whereas if "continuous load," the factor would apply to all motors supplied by the feeder.

Since tap conductors on the supply side of a motor branch circuit overcurrent device is a feeder, per definition, the reference to Section 430-22 would clearly indicate it applies to that portion of the circuit conductors.

Proposed Exception No. 1 is to allow for increased ampacity rating where lower temperatures prevail. This could be critical for some "border-line" ampacities for installations underground or in controlled climate environments.

In Exception No. 2, wording is revised to clearly indicate nonfused switches, transfer switches, and clock-operated switches (listed for 100 percent of rating) can be used. Present wording suggests the assembly necessarily includes overcurrent devices. The word "supplying" supplants "protecting" to cover such assemblies and for technical correctness since overcurrent devices at the end of a tap limit protection to overloads. The reference to other chapters would correlate with ampacity requirements which in general do not permit 100 percent ampacity factor for continuous duty motors, which present wording appears to do, if the motors operate for less than three hours. Note that Section 430-24 requires motor conductor ampacity plus ampere rating of other loads, not conductor ampacity for continuous loads.

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

PANEL ACTION: Accept in Part.

The panel accepts the portion of the recommendation changing "equal to or greater" to "not less", and rejects the remainder of the recommendation.

PANEL STATEMENT: The rejected portions of the proposal are rejected based on the following:

1) The first sentence is accurate as written in the present code. Computed load would imply that conductors serving loads could have some additional computed factor applied. Article 220 provides the necessary information for determining the load in question.

2) The changes relative to motor circuit conductors are unnecessary. 215-1 states that feeders are sized in accordance with Article 220. 220-3 states that Article 430 is used for motor loads.

3) The proposed Exception No. 1 is unnecessary, since 310-15 already allows this to be applied to determine conductor ampacity.

4) The wording for "integral" overcurrent devices is unnecessary. The present requirement is for "listed assemblies" which covers the various arrangements of overcurrent devices.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #4114)

2- 243 - (215-2(a)): Accept in Part

SUBMITTER: Truman C. Surbrook, Michigan State University
RECOMMENDATION: Revise the second sentence of the section as follows with the deletions and additions as indicated:

~~"The minimum feeder-circuit conductor size, before the application of any adjustment or correction factors, shall have an allowable ampacity equal to or greater not less than the noncontinuous load plus 125 percent of the continuous load."~~

SUBSTANTIATION: The phrase "before the application of any adjustment or correction factors" is particularly confusing to electricians making conductor ampacity selection when

adjustment factors are being used. Some apply the adjustment factors to the allowable ampacity found in the appropriate table and then compare it with 100 percent of both continuous load and noncontinuous load, others compare the adjusted allowable ampacity to the sum of 100 percent of the noncontinuous load and 125 percent of the continuous load. By removing the confusing statement, it makes the section clear that the adjusted allowable ampacity of the conductor is not permitted to be less than the sum of 100 percent of the noncontinuous load plus 125 percent of the continuous load.

PANEL ACTION: Accept in Part.

The panel accepts the change of "equal to or greater" to "not less".

The remainder of the proposal is rejected.

PANEL STATEMENT: The text recommended for deletion is necessary for proper application of the section. The second sentence of 215-2(a) establishes the minimum conductor size permitted for a circuit supplying any continuous loads. Actual conductor allowable ampacity (relative to the load current) is determined by applying 310-15 including the adjustment factors. This allows the allowable ampacity calculation to take advantage of higher temperature ratings on conductor insulation.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #4115)

2- 244 - (215-2(a), Exception): Accept in Principle

SUBMITTER: Truman C. Surbrook, Michigan State University

RECOMMENDATION: Revise the Exception as follows:

"Where the assembly, including the overcurrent devices protecting the feeder(s), is listed for operation at 100 percent of its rating, the allowable ampacity of the feeder conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load, and not less than the rating of the overcurrent device."

SUBSTANTIATION: The addition of the word "allowable" ampacity should make it clear that it is the ampacity under the prevailing conditions including the application of adjustment factors if they apply.

The rule for sizing conductors when the overcurrent device is listed for 100 percent operation and one that is not such listed can lead to widely different conductor sized for the same identical load. At least in the case where the overcurrent device is listed for 100 percent operation, the minimum allowable ampacity of the conductor should not be permitted to be less than the rating of the overcurrent device. The following example illustrates the point.

Example: If a feeder supplies a continuous load of 130 amperes and the overcurrent device and enclosure are listed for operation at 100 percent of its rating then the overcurrent device is permitted to be rated at 150 amperes. In this case the conductor is permitted to be sized based upon an allowable ampacity not less than 100 percent of the continuous load. If copper conductors are used with 75°C insulation and terminations, the maximum conductor size required would be AWG #1 which is listed in Table 310-16 as 130 amperes. If the overcurrent device had not been listed for 100 percent operation, the minimum overcurrent device rating for this load would have been 175 amperes and the minimum conductor size would have been AWG #2/0. This seems to be a wide difference in minimum conductor size for the same identical load simply because one overcurrent device is rated for 100 percent operation and the other is not.

PANEL ACTION: Accept in Principle.

Revise the exception in the existing Code to read as follows:

Exception: Where the assembly, including the overcurrent devices protecting the feeder(s), is listed for operation at 100 percent of its rating, the allowable ampacity of the feeder conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load. In no case shall the ampacity be less than the rating of the overcurrent device."

PANEL STATEMENT: The panel has accepted the submitter's recommendation relative to the use of "allowable" in the exception. The submitter's wording can be interpreted to be permissive relative to the minimum sizing compared to the overcurrent device. As such, the panel has revised the exception to accomplish the objective using clearer language.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

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VOTE ON PANEL ACTION:
AFFIRMATIVE: 12

(Log #689)

2- 245 - (215-2(d) (New)): Reject

NOTE: It was the action of the Technical Correlating Committee that this Proposal be referred to Code-Making Panel 4 for action in Article 225. This action will be considered by the Panel as a Public Comment.

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Add a new paragraph (d) to read as follows:

(d) Feeder conductors covered by Article 225 shall have an ampacity not less than (1) 100-amperes 3-wire single-phase or 60-(70)- amperes 4-wire three-phase where supplying a one-family dwelling; (2) 60-amperes 3-wire single-phase or 30 (40) -amperes 4-wire three-phase where supplying an individual dwelling unit of a two-family or multifamily dwelling. The ampacity for a neutral conductor shall be permitted to be determined in accordance with Section 220-22. Conductor ratings specified in Table 310-15(b) (6) shall be permitted.

(ampacity figures in parentheses are alternate choices)

SUBSTANTIATION: Specific minimum ampacities for feeder conductors covered in Article 225 and supplying a dwelling unit do not appear to be covered in the Code. Section 230-42(b) in effect, requires minimum service conductor rating of 100 amperes 3-wire for a one-family dwelling and 60-amperes for dwelling units of two-family or multi-family dwellings.

Sections 225-39(c) and (d) requires a minimum disconnecting means rating of 100-amperes 3-wire for a one-family dwelling, and 60-amperes for units of two-family or multifamily dwellings as correlation with Section 230-79. Feeder conductors should also correlate with Section 225-39.

A 60-ampere 3-phase 4-wire 208y/120-volt system can supply a volt-ampere load midway between that of 120/240-volt and 208y/120-volt single-phase systems. Three-phase 4-wire systems for dwellings do not appear to be prohibited by the code.

PANEL ACTION: Reject.

PANEL STATEMENT: Code-Making Panel 2 does not agree that it is necessary to establish a minimum rating for feeders supplying a dwelling unit. The panel requests that the Technical Correlating Committee refer this proposal to Code-Making Panel 4 for action since this is under the scope of Article 225.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #1780)

2- 246 - (215-3 Exception No. 2 (New)): Accept

SUBMITTER: Noel Williams, Noel Williams Consulting

RECOMMENDATION: Add Exception No. 2 as follows:

"Exception No. 2: Overcurrent protection for feeders over 600 Volts, nominal shall comply with Part I of Article 240."

SUBSTANTIATION: Although the current rule applies to virtually all types of feeders, the rules for feeders of over 600 volts are not recognized in this section. This creates a conflict between Article 215 and Article 240.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #690)

2- 247 - (215-4(a)): Accept

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

(a) Feeders with Common Neutral. ~~Feeders containing a common neutral shall be permitted to supply two Two or three sets of 3-wire feeders, or two sets of 4-wire or 5-wire feeders shall be permitted to utilize a common neutral.~~

SUBSTANTIATION: Editorial. Present wording indicates feeders supplying feeders. Branch circuits may be supplied.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:
AFFIRMATIVE: 12

(Log #691)

2- 248 - (215-5): Reject

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise last sentence to read as follows:

Such a diagram shall show the area in square feet of the building or other structure supplied by each feeder, the total ~~connected~~ computed load before applying demand factors...

(remainder unchanged).

SUBSTANTIATION: Editorial. All loads are not connected loads, per se, such as those based on square foot area, or assigned to specific type circuits, or number of outlets. Connected loads are still computed and would be included.

PANEL ACTION: Reject.

PANEL STATEMENT: The use of the term "connected load" is consistent with the usage of the term elsewhere in the code.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #1747)

2- 249 - (215-5): Reject

SUBMITTER: Jamie McNamara, Hastings, MN

RECOMMENDATION: Revise as follows:

215-5. Diagrams of Feeders. If required by the authority having jurisdiction, a diagram showing feeder details shall be provided prior to the installation of the feeders. Such a diagram shall show the area in square feet of the building or other structure supplied by each feeder, the total connected load before applying demand factors, the demand factors used, the computed load after applying demand factors, and the size and type of conductors to be used. If required by the authority having jurisdiction, the computed load after apply the demand factors and the date the computation was done, shall be posted at the point were the feeder receives its supply.

SUBSTANTIATION: In cases were the AHJ requires these diagrams/calculations the information is readily known and available at the original time of installation. This requires very little work to post this at the panelboard were the feeder originates when you already have the information. This is valuable information for people to know, This information is often lost or not available shortly after installation, the date the calculation was done is also pertinent information AHJ is often apprehensive about requiring a diagram of a feeder due to the time and expense involved in doing one. This information is needed to make a safe decision as to the adequacy of the existing system.

PANEL ACTION: Reject.

PANEL STATEMENT: The authority having jurisdiction can already require that this information be posted without changes in the Code.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #692)

2- 250 - (215-8): Reject

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

Means of Identifying Conductor with the Higher Voltage to Ground. On a 4-wire delta-connected ~~secondary system~~ where the midpoint of one phase is grounded ~~to supply lighting and similar loads~~ the phase conductor having the higher voltage to ground shall be ~~identified~~ distinguished from the other phase

conductors by a continuous outer finish that is orange in color along its entire length or by tagging or other effective means except that a conductor larger than No. 6 shall be permitted to be identified at the time of installation by a permanent distinctive orange marking that shall encircle the conductor insulation. Such identification shall be provided placed at each point where a connection is made conductor termination, at each junction point except conduit bodies that do not contain splices or unused hubs, and at intervals not exceeding 6 ft (1.83 m), but not less than one such intermediate marking, where installed in a wireway, auxiliary gutter, or cable tray. Such identification shall be provided placed in accordance with the above at each point where the grounded conductor is also present.

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SUBSTANTIATION: This section permits field marking for conductors regardless of size which does not conform to field marking for grounded or grounding conductors. Are the safety considerations any less? Present wording infers that other phase conductors are not to be orange but requires an interpretation of intent since it is not specifically prohibited. The word "secondary" may be inferred as an on-site transformer, whereas the source of the feeder may be a service or generator. The word "system" is encompassing.

Proposal 5-20 in the 1998 ROP provided for marking that encircles the grounded conductor, the substantiation for which is applicable for all field marking.

Junction points such as pull boxes, and conductors in wire-ways, auxiliary gutters, and cable trays are amenable to future connections and marking at installation prior to later connections would be desirable. Conduit bodies with no splices or unused hubs are less likely tap points.

PANEL ACTION: Reject.

PANEL STATEMENT: The requirement to identify the high-leg of a feeder is based on specific connection issues to equipment. Requirements to identify the grounded and grounding conductors are based on much more extensive concerns. Applying the grounded conductor rules to the high-leg marking is not substantiated by the submitter.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #1501)

2- 251 - (215-8): Reject

SUBMITTER: Larry D. Wendt, State of Idaho/Rep. I.A.E.I.

RECOMMENDATION: Revise text as follows:

215-8. Means of Identifying Conductor with the Higher Voltage to Ground. On a 4-wire, delta-connected secondary where the midpoint of one phase winding is grounded to supply lighting and similar loads, the phase conductor having the higher voltage to ground shall be identified by an outer finish that is orange in color or by tagging or other effective means. Such identification shall be placed at each point where a connection is made if the grounded conductor is also present. See Section 110-15.

SUBSTANTIATION: Means of identifying conductor with the higher voltage to ground is a requirement that should be in Section 110-15 for requirements for electrical installations where it would apply to all types of installations instead of this location. It would also streamline and simplify the code for easier usage.

Please coordinate with proposals on Sections 110-15, 210-4(d), 230-56, 384-3(e), and 384-3(f).

PANEL ACTION: Reject.

PANEL STATEMENT: The cross-reference from 215-8 back to the proposed section is unnecessary since the two items would be identical.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #4416)

2- 252 - (215-10): Reject

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

SUBMITTER: Charles Meeker, Electro-Test, Inc.

RECOMMENDATION: Revise text to read as follows:

215.10. Ground-Fault Protection of Equipment. ~~Each feeder disconnect(s) rated 1000 amperes or more and installed on solidly grounded wye electrical systems of more than 150 volts to ground, but not exceeding 600 volts phase-to-phase, shall be provided with ground-fault protection of equipment in accordance with the provisions of Section 230.95.~~

SUBSTANTIATION: There are two reasons for proposing these changes.

1. The deleted words are redundant and unnecessary.

2. To eliminate conflict between proposed changes to 230-95.

The intent of the change is based on the hazards of arcing ground-faults which are determined by total system capacity, and not the size of an individual disconnect rating. Therefore, it is the equipment rating of 1000 amperes or greater that should be used to determine the need for ground-fault protection. For

example, the number of individual disconnecting means, as allowed by 230-71, does not reduce the potential hazard to person or equipment of arcing ground-faults, if the rating of the equipment is still 1000 amperes or greater.

PANEL ACTION: Reject.

PANEL STATEMENT: The text in 215-10 is necessary for the application of ground fault protection on feeders. Should revisions be made to 230-95, Code-Making Panel 2 will review those and act accordingly.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #439)

2- 253 - (215-12 (New)): Reject

SUBMITTER: Glenn W. Zieseniss, Crown Point, IN

RECOMMENDATION: Add a new section stating the following:

215-XX. Access to Occupants. Each occupant shall have access to the occupant's supply disconnecting means as described in Article 225, Section 35.

SUBSTANTIATION: Section 240-24(b) addresses Overcurrent (OC) devices accessible to occupant(s). This new 215-xx would address a feeder disconnecting means, which may or may not be an OC device. If the feeder disconnecting means is located in another portion of a small, 3 or 4 unit apartment building (even if the owner of the building lives in one unit), he/she will not be available 24 hours a day every day of the year(s). The occupant needs access to the disconnecting means as per 225-35 as if it were in another building or structure.

By referring to the 225-35 section, this reduces the amount of words in the NEC.

PANEL ACTION: Reject.

PANEL STATEMENT: This requirement is addressed in Sections 225-35 and 240-24. It is not necessary to restate this in Article 215.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

ARTICLE 220 — BRANCH-CIRCUIT, FEEDER, AND SERVICE CALCULATIONS

(Log #453)

2- 254 - (220): Accept

SUBMITTER: Technical Correlating Committee National Electrical Code

RECOMMENDATION: 1. In Section 220-3(b)(8)(a), replace "5 ft (1.52 m)" with "1.5 m (5 ft)".

2. In Section 220-3(b)(8)(b), replace "1 ft (305 mm)" with "300 mm (1 ft)".

3. In Section 220-3(c)(1), replace "500 ft² (46.5 m²)" with "46.5 m² (500 ft²)".

4. In Section 220-12(b), replace "2 ft (610 mm)" with "600 mm (2 ft)".

5. In Section 220-30(b)(2), replace "3 volt-amperes per square foot (0.093 m²)" with "33 volt-amperes/m² or 3 volt-amperes/ft²".

6. In Section 220-31 2nd paragraph, replace "3 volt-amperes/ft² (0.093 m²)" with "33 volt-amperes/m² or 3 volt-amperes/ft²".

7. In Section 220-31(2), replace "3 volt-amperes/ft² (0.093 m²)" with "33 volt-amperes/m² or 3 volt-amperes/ft²".

8. In Section 220-32(c)(2), replace "3 volt-amperes/ft² (0.093 m²)" with "33 volt-amperes/m² or 3 volt-amperes/ft²".

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 the inch-pound units immediately following in parenthesis. The inch-pound numbers are not shown in parenthesis for items 5 through 8 since they are not a direct conversion. Separate loads for these items are given based on square meters and square feet

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

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VOTE ON PANEL ACTION:

AFFIRMATIVE: 11

NEGATIVE: 1

EXPLANATION OF NEGATIVE:

BROWN: The use of "hard Conversions" should be reevaluated. The proposed metric measurements do not correlate with the respective English measurements as used in such documents as model building codes, and standards such as ANSI A117.1. The Technical Correlating Committee should correlate all of these metric changes in the NEC with those dimensions already accepted throughout the industry. Using the proposed dimensions and factors, it is possible to calculate a load that will be 2 percent higher than is now required.

COMMENT ON AFFIRMATIVE:

BECKER: Consideration should be given to using a metric load that is less than the 1 in.-pound load, to encourage trades people to use the SI units. In this case, 32 volt-amperes would be approximately 1 percent less than the soft conversion of 32.58 volt-amperes, compared to 33 volt-amperes being 2.3 percent greater.

(Log #3821)

2- 255 - (220): Reject

SUBMITTER: Philip Morgans, Riviera Electric

RECOMMENDATION: Section 220 should have two sections that cover standard and optional load calculations for apartment buildings including house loads.

SUBSTANTIATION: It is unclear about how to calculate loads for apartment buildings in regard to standard vs. optional calculation.

PANEL ACTION: Reject.

PANEL STATEMENT: No proposed text was provided in accordance with 4-3.3 of the Regulations Governing Committee Projects.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #3837)

2- 256 - (220, Appendix D): Reject

SUBMITTER: Bill Kolson, Riviera Electric

RECOMMENDATION: Revise text to read:

"This change would allow users of the code, quick and easy reference to the examples ~~without having to leave the article to fix them~~ by having them located within the article they pertain to. This would greatly simplify the usage of Article 220 and would eliminate the need to reference code users to Appendix D.

SUBSTANTIATION: All of the example calculations for one family and multiple dwelling are located currently in Appendix D. When working these calculations using Article 220, it would be more time saving for the electrician to have these examples contained in the article they pertain to rather than having to flip to the back of the code book to use them.

PANEL ACTION: Reject.

PANEL STATEMENT: Appendix D contains examples, not mandatory code. The NEC Style Manual indicates that explanatory materials are to be in an Annex.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #3840)

2- 257 - (220): Reject

SUBMITTER: Dean Hauck, Riviera Electric

RECOMMENDATION: The NEC should include a section in the code book that lists formulas that would be used in the field. Such as ohm's law, voltage drop, containers, capacitors, inductance etc. (using a perforated page would allow testing agencies to remove these for testing purposes). Having these formulas would help the electricians in the field.

SUBSTANTIATION: It is difficult to remember all these formulas, so having a section at lists all formulas for calculations would save a lot of time and money for our employers, not to mention correct calculations for safety and correct operation of electrical systems.

PANEL ACTION: Reject.

PANEL STATEMENT: This is a design or engineering consideration as outlined in Section 90-1(c) and is not appropriate in the Code. In addition, this proposal does not conform to 4-3.3 of the Regulations Governing Committee Projects.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #1467)

2- 258 - (220-1 Exception No. 2 (New)): Reject

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

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

RECOMMENDATION: Change the exception to Exception No. 1 and add Exception No. 2 to read:

Exception No. 2: Outdoor feeders over 600 volts as covered in Article 225, Part C.

SUBSTANTIATION: New proposals for Article 225 created by a task group to address over 600 volt issues in the code, if accepted, will make this new exception necessary.

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 that 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: Reject.

PANEL STATEMENT: The panel questions adding an exception to remove calculations for over 600 volt feeders from the scope of Article 220. Should specific rules for calculating loads over 600 volts be necessary, the appropriate placement is in Article 220.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

COMMENT ON AFFIRMATIVE:

ROCHE: Even though there is already one exception to the concept of all load calculations being in Article 200, I agree that the proper place for guidance for calculating loads for over 600 volt feeders should be in Article 220 instead of Article 225. Rules could be developed for all circuits over 600 volts, not just outside circuits. With this concept in mind, I suggest that the rules incorporated by CMP 4 action on Proposal 4-40b be moved into a new Part E of Article 220. Part E would be titled "E. Method of Sizing Conductors for Circuits Over 600 Volts".

This would also require coordination with CMP 4 actions on Proposals 4-4, 4-7, 4-7(a), 4-39, and 4-40(b).

(Log #3826)

2- 259 - (220-2(b)): Accept in Principle

SUBMITTER: Fred Deffenbaugh, Riviera Electric

RECOMMENDATION: Add text:

"It is permitted to drop a fraction of an ampere of less than 0.5."

SUBSTANTIATION: Except where computations result in a fraction of an ampere 0.5 or larger, such fractions shall be permitted to be dropped. (This is not clear).

PANEL ACTION: Accept in Principle.

Revise existing Section 220-2(b) to read as follows:

"Where computations result in a fraction of an ampere that is less than 0.5, such fractions shall be permitted to be dropped."

PANEL STATEMENT: The revised text meets the intent of the submitter and provides clarity.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

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VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #4426)

2- 260 - (220-2(b)(8)): Accept in Principle

SUBMITTER: Paul Dobrowsky, Holley, NY

RECOMMENDATION: Add a new sentence as follows:

"The length used for the computation shall be based on the portion that contains receptacle outlets.

SUBSTANTIATION: Multioutlet assemblies are commonly installed in department stores and office buildings as free standing, vertical "power poles". The multioutlet assemblies are commercially available as listed products with one or more receptacles located near the end intended to be supported from the floor. The entire length of the assembly may be 20 or 30 feet but the portion containing receptacles is typically less than 1 foot. The load is typically a cash register or office equipment.

Presently one would have to use the entire length of the assembly (the majority of which contains no receptacles and therefore has no load) to determine the load computation. This application could be similar to installing a free standing conduit drop having a threaded "FS Type" Box, containing a receptacle, located near the floor. The computation in this case would only be 180 volt-amperes. See also the definition for Multioutlet Assembly in Article 100.

PANEL ACTION: Accept in Principle.

Add a new second sentence to the opening paragraph of existing Section 220-3(b)(8) to read as follows:

"For the purposes of this section, the computation shall be permitted to be based on the portion that contains receptacle outlets."

PANEL STATEMENT: The revised wording meets the intent of the submitter and provides clarity.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #4402)

2- 261 - (220-2(c) (New)): Reject

SUBMITTER: Richard W. Becker, Engineered Electrical Systems, Inc.

RECOMMENDATION: Add a paragraph to read:

(c) Load Calculations. Calculations shall be in units of kVA. Except where the computations result in a fraction of a kVA 0.05 or larger, such fractions shall be permitted to be dropped.

SUBSTANTIATION: This proposal deals with "significant digits". Calculations using Volt-Amperes are cumbersome and difficult to interpret. When kVA is rounded to one decimal point, loads less than 40 VA are rounded down and 50 VA and greater are rounded up. Statistically, the rounding results in an insignificant difference and makes the information much easier to process.

PANEL ACTION: Reject.

PANEL STATEMENT: This is an engineering consideration. There are other methods used to calculate loads, and the panel does not agree that units of kVA should be mandated.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #452)

2- 262 - (220-3(a)): Accept

SUBMITTER: Technical Correlating Committee National Electrical Code

RECOMMENDATION: Revise the first sentence of Section 220-3(a) to read as follows:

"A unit load of not less than that specified in Table 220-3(a) for occupancies specified therein shall constitute the minimum lighting load for each square foot (0.093 m²) of floor area."

SUBSTANTIATION: Deleting the material noted in the proposal eliminates the need to revise it to the metric format. Also, the deleted material is not necessary since Table 220-3(a) includes the proper reference to square foot or square meter.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #1444)

2- 263 - (220-3(a)): Reject

SUBMITTER: Barry F. Tower, Patten, ME

RECOMMENDATION: Keep the first sentence as is.

Change the second sentence to read as follows:

"The floor area for each floor including finished basements and unfinished basements adaptable for future use shall be computed from the outside dimensions of the building, dwelling unit, or other area involved."

Keep the third sentence as is.

SUBSTANTIATION: The purpose of this proposal is to clarify what is already the intent of the "code". A previous CMP 2 has already indicated that unfinished basements must be included in the square footage calculations if they are adaptable for future use. Please see the 1995 NEC ROP 2-405. The actual wording change that I am proposing is that I have inserted the following ten words into that existing sentence: "including finished basements and unfinished basements adaptable for future use."

Including the basement or not including the basement when calculating square footage can make a tremendous difference (It can be twice as much). Something this significant should be clarified.

PANEL ACTION: Reject.

PANEL STATEMENT: The present code requirements are clear in their intent. The second sentence applies to all buildings, the third sentence applies to dwelling units.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #1886)

2- 264 - (220-3(a)): Reject

SUBMITTER: Richard D. Thompson, Thompson Assoc.

RECOMMENDATION: Add to: Type of Occupancy; Unit load per square foot (volt-amperes)

Motion Picture and Television Production Soundstages and Approved Production Facilities 35

SUBSTANTIATION: NFPA 140, "Standard for Motion Picture and Television Production Soundstages and Approved Production Facilities" was adopted by the NFPA at their May 1999 annual meeting. In this new standard, Section 3-5 Electrical Requirements, states in 3-5.1 that "Soundstages and approved production facilities shall be provided with a minimum of 35 W/ft² (377 W/m²) dedicated for production lighting and power."

The NFPA Technical Committee that developed NFPA 140 consisted of representatives of the major film and television studios, fire departments, insurance underwriters, and knowledgeable industry personnel. In their deliberations, it was strongly urged to add to this fire code standard a minimum requirement for the electrical power used for set lighting. Typically, lighting fixtures in the 1000, 2000, 5000 and 10,000 watt sized are used in lighting motion picture and television productions. The committee found that many productions were and continue to be filmed in industrial buildings where the installed electrical service is woefully inadequate. Typically, portable generators are needed to augment the existing electrical service. This requirement in NFPA 140 does not preclude the use of portable generators, should the needs of the production exceed this minimum requirement.

It is the intent of this proposal to the 2002 NEC to incorporate this provision from NFPA 140 into the Electrical Code so as to facilitate the knowledge and information of this new requirement such that the AHJ, electrical engineers, building owners and studio operators can comply with this standard.

PANEL ACTION: Reject.

PANEL STATEMENT: NFPA 140, Section 3-5.1 deals with lighting and power requirements for these facilities. NEC Table 220-3(a) only applies to general lighting loads. The submitter's proposal would require the full 35 VA per sq. ft. for lighting only which the panel does not believe is the submitter's intent. The panel questions whether a sound stage is a general lighting load.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

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(Log #454)

2- 265 - (Table 220-3(a)): Accept in Principle
SUBMITTER: Technical Correlating Committee National
 Electrical Code
RECOMMENDATION: Replace Table 220-3(a) with the following table:

Table 220-3(a) General Lighting Loads by Occupancy

| Type of Occupancy | Unit Load Volt-Amperes per Square Meter | Unit Load Volt-Amperes per Square Foot |
|---|---|--|
| Armories and auditoriums | 11 | 1 |
| Banks | 39 ^b | 3 1/2 ^b |
| Barber shops and beauty parlors | 33 | 3 |
| Churches | 11 | 1 |
| Clubs | 22 | 2 |
| Court rooms | 22 | 2 |
| Dwelling units ^a | 33 | 3 |
| Garages – commercial (storage) | 6 | 1/2 |
| Hospitals | 22 | 2 |
| Hotels and motels, including apartment houses without provision for cooking by tenants ^a | 22 | 2 |
| Industrial commercial (loft) buildings | 22 | 2 |
| Lodge rooms | 17 | 1 1/2 |
| Office buildings | 39 ^b | 3 1/2 ^b |
| Restaurants | 22 | 2 |
| Schools | 33 | 33 |
| Stores | 33 | 3 |
| Warehouses (storage) | 3 | 1/4 |
| In any of the above occupancies except one-family dwellings and individual dwelling units of two- family and multi-family dwellings: | | |
| Assembly halls and auditoriums | 11 | 1 |
| Halls, corridors, closets, stairways | 6 | 1/2 |
| Storage spaces | 3 | 1/4 |

^aSee Section 220-3(b)(10).

^bIn addition, a unit load of 1 volt-ampere/ft² or 11 volt/ampere/m² shall be included for general-purpose receptacle outlets where the actual number of general-purpose receptacle outlets is unknown.

SUBSTANTIATION: The proposed revision is intended to comply with the NFPA No. 1M Manual of Style Section 4.1 with respect to values of measurement. The inch-pound numbers are not shown in parenthesis since they are not a direct conversion. Separate unit loads are given based on square feet and square meters.

PANEL ACTION: Accept in Principle.

In the proposed table, in the row for "Schools", change the number in the "Volt-Amperes per Square Foot" column from "33" to "3".

In superscript "b" at the bottom of the table, delete the slash between "volt" and "ampere". In addition in "b" reverse the english and the metric units.

PANEL STATEMENT: The revisions to the table are editorial.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 11

NEGATIVE: 1

EXPLANATION OF NEGATIVE:

BROWN: See my Explanation of Negative Vote on Proposal 2-254.

million people, or 10 percent of the workforce, now telecommute, supporting the growing residential use of computers, printers, fax machines, copiers, etc. In fact, 55 percent of all U.S. households now have one or more computers (Parks Associates, Forum99, October 1999), and this is expected to grow further to 75-80 percent within the next 10 years. Many other appliances VCRs, DVDs, room heaters, room air-conditioners, hair dryers, curling irons, exercise equipment, remote telephones, answering machines, etc., have become commonplace in dwellings. Electric chain saws, snow throwers, hedge clippers, edgers, leaf blowers, etc., have also proliferated in usage.

The Code should recognize this dramatic increase in electric requirements by revising the Code to accurately reflect the current and projected simultaneous electricity demands in dwellings. Even the increased value of 4-1/2 volt-amperes per square foot is modest compared to the amount of electrical products currently in use and the anticipated continuing increase in the coming decades. The dwellings being built today need to be able to handle the electrical load for up to 50 years from now.

PANEL ACTION: Reject.

PANEL STATEMENT: The submitter has not considered in his substantiation that utilization equipment manufactured today is more efficient than in the past. For such a change, the panel would need to review actual engineering field measurements to show that 3 VA/sq. ft. is insufficient.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #4133)

2- 266 - (Table 220-3(a)): Reject

SUBMITTER: David T. Brender, Cooper Development Assn. Inc.

RECOMMENDATION: In Table 220-3(a), change the Unit Load per Square Foot (Volt-Amperes) for Dwelling Units from 3 to 4-1/2.

SUBSTANTIATION: The current Unit Load per Square Foot for dwelling units has been at 3 in the Code for at least 30 years (1968 NEC). During this period, there has been an explosion of electrical products being used in dwelling units. Where, in the sixties, there might have been one TV, stereo, or hair dryer in a home, there are now multiple appliances throughout the dwelling. Recent research (International Telework Association and Council-report released October 27, 1999) indicates that 19.2

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(Log #2892)

2- 267 - (220-3(b)): **Reject**
SUBMITTER: James Maldonado, City of Tempe, AZ/Rep.
 Central Arizona Chapter IAEL
RECOMMENDATION: Add new subsections (11) to Section 220-3(b) to read as follows:

(8) For purposes of calculations and installation requirements, the following loads and branch circuit requirements may be used where the actual nameplate rating is not available.

| | LOAD | CONDUCTOR AMPACITY | SINGLE PHASE NOMINAL VOLTAGE |
|---|----------|-----------------------|------------------------------------|
| Electric Clothes Dryer | 5000 VA | 30 Ampere | (120/240V) |
| Water heater | 4500 VA | 30 Ampere | (240V) |
| Dishwasher | 1500VA | 20 Ampere | (120V) |
| Garbage Disposal | 720 VA | 20 Ampere | (120V) |
| Evaporative Cooler | 1200 VA | 20 Ampere | (120V) |
| Compactor | 1500 VA | 20 Ampere | (120V) |
| Wall Mounted Oven or Counter Mounted | 6000 VA | 30 Ampere | (120/240V) |
| Cooking Units Range | 12000 VA | 50 Ampere | (120/240V) |
| Gas Fire Clothes Dryer | 1500 VA | 20 Ampere | (120V) |
| Clothes Washer | 1500 VA | 20 Ampere | (120V) |
| Microwave Ovens (Fixed) | 1200 VA | 20 Ampere | (120V) |

NOTE: The above calculations are without appropriate NEC demands, which may be taken where permitted in the NEC. If appliances are installed having higher nameplate ratings than the minimum loads specified above, the conductors shall be increased to the proper size. Where limited storage capacity water heaters are specified, the nameplate rating of the unit(s) shall be used.

SUBSTANTIATION: These loads are necessary to allow for calculating loads prior to having the complete data on equipment that has not been purchased. These loads will allow for most equipment to be installed while having an electrical system that is designed with adequate ampacity. These values do not have to be used if the equipment planned for has already been specified and the values are known. Too many times designers choose values they are familiar with while not completely specifying the equipment being designed for.

PANEL ACTION: Reject.

PANEL STATEMENT: This is a design issue. See Section 90-1(c). It is not possible for the code to anticipate all of the loads of available appliances.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

single piece of equipment consisting of a multiple receptacle comprised of four or more receptacles shall be computed at not less than 90 volt-amperes per receptacle.

SUBSTANTIATION: To be consistent with the text presently in Definitions Article 100 page 23 for "Receptacle" and as used elsewhere in the Code.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #3818)

2- 268 - (220-3(b)): **Reject**

SUBMITTER: Don Crawford, Riviera Electric

RECOMMENDATION: Delete this section.

SUBSTANTIATION: By deleting this section and only using 220-12(a) as reference this will eliminate duplication and/or duplication unnecessarily. This duplication is confusing and causes uncertainty.

PANEL ACTION: Reject.

PANEL STATEMENT: It is unclear which section the submitter wants to delete. It should be noted that Section 220-12(a) pertains to demand factors for computing feeder and service loads for show windows. Section 220-3(b)(7) is used to compute show window branch circuit loads.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #2835)

2- 269 - (220-3(b)(1)): **Accept**

SUBMITTER: Melvin K. Sanders, Ankeny, IA

RECOMMENDATION: Replace "strap" with "yoke":

(9) Receptacle Outlets. Except as covered in (10), receptacle outlets shall be computed at not less than 180 volt-amperes for each single or for each multiple receptacle on one ~~strap~~ yoke. A

2- 270 - (220-3(b)(3)): **Accept in Principle in Part**

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise text to read:

"Motor Loads. Outlets for motor loads shall be computed based on maximum current ratings in accordance with the requirements in Sections ~~430-22 and 430-24 and Article 440.~~ 430-6(a), (b), (c), and (d), and the rated load current or branch-circuit selection current as covered in Section 440-2 for hermetic refrigerant motor-compressors."

SUBSTANTIATION: Sections 430-22 and 430-24 do not relate directly to load computations, but conductor ampacity, which is not the same, but separate considerations. While it is common to include the largest motor factor (25 percent) and continuous load factor (125 percent) to simplify calculations for panelboard, feeder, and service loads, those factors are technically for conductor ampacities, not load computations.

This section infers motor supply conductor ampacity constitutes the computed load which is misleading and incorrect.

If the requirements of Section 430-22(b) for a continuous duty motor for varying duty to have supply conductors of 200 percent of the motor nameplate current rating is used for load calculation there would be a phantom load increase of 100 percent for the branch circuit load. Section 220-14 for feeders and services does not reference Section 430-22 even though they may supply only a single branch circuit for such a motor.

The present reference to Article 440 is not specific; Code users should be directed to explicit sections that apply.

PANEL ACTION: Accept in Principle in Part.

Revise 220-3(b)(3) in the existing code by replacing "Article 440" with "Section 440-6".

The panel rejects the remainder of the proposal.

(Log #1152)

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PANEL STATEMENT: The panel accepts in principle the part of the recommendation referencing a specific section in Article 440. The proper reference is 440-6. The panel rejects the remainder of the proposal because the references make it clear what rules to use. It is the intent of the panel to use the same rules for motor conductor calculations as load calculations.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #693)

2- 271 - (220-3(b)(6)): Reject

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

(6) Sign and Outline Lighting Each branch circuit specified in Section 600-5(a) for sign and outline lighting outlets shall be computed at not less than 1200 volt-amperes. for each branch circuit specified in Section 600-5(a).

SUBSTANTIATION: Editorial. Section 600-5(a) allows one or more outlets on the sign circuit. Present wording can be interpreted as applying the minimum load to each outlet or the sum total of outlets. Proposal clearly assigns the load to the circuit.

PANEL ACTION: Reject.

PANEL STATEMENT: The present text is clear, and states specifically that the computed load is a minimum of 1200 va for each branch circuit specified in 600-5(a).

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #694)

2- 272 - (220-3(c)(1), (2)): Accept in Principle in Part

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

(1) Dwelling Units. General lighting Loads loads for structural additions to an existing dwelling unit or for a previously unwired portion of an existing dwelling unit Either of which exceed 500 ft² (46.5m²) shall be computed in accordance with ~~(b)~~ (a).

Loads for new circuits or extended circuits for other than general lighting in previously wired dwelling units shall be computed in accordance with either (a) or (b).

(2) Other than Dwelling Units. Loads for new circuits or extended circuits in other than dwelling units shall be computed in accordance with either (a) or (b), as applicable.

SUBSTANTIATION: The first sentence of (1) appears intended to apply to general lighting loads since the reference to (b) is apparently an oversight carried over from the 1996 code where (b) was titled Lighting Load for Listed (Specific) occupancies, which is now (a). Without such distinction, the addition or unwired portions are equally covered by the last sentence.

The present reference to (b) doesn't allow Table 220-3(a) to be used.

The present wording allows up to 500 sq ft to be wired without a load computation; at 3va/sq ft this could be a normally computed load of 1500 va. This exemption doesn't apply for the last sentence of (1) if (a) is selected, nor for (2) where (a) is selected. This is inconsistent and doesn't make sense.

If the intent is to apply a distinction between general lighting and other loads the reference to (a) should be deleted in the second sentence as that covers "other loads". If the intent is to permit either (a) or (b) the first sentence should be deleted as it is then superfluous and contradictory.

Present wording of (2) literally allows either (a) (general lighting) or (b) (other loads) to be used for computation without distinction of the type of load supplied.

PANEL ACTION: Accept in Principle in Part.

Revise existing section 220-3(c)(1) to read as follows:

"(1) Dwelling Units.

a. Loads for structural additions to an existing dwelling unit or for a previously unwired portion of an existing dwelling unit, either of which exceeds 46.5m² (500 ft.²), shall be computed in accordance with 220-3(a) and (b).

b. Loads for new circuits or extended circuits in previously wired dwelling units shall be computed in accordance with either 220-3 (a) or (b), as applicable."

The panel rejects the deletion of "Either of which exceed 500 ft²".

The panel accepts the suggested change in (2) of the proposal.

PANEL STATEMENT: The revised wording meets the intent of the submitter and provides clarity. New additions need to comply with both (a) and (b). No substantiation was given for deleting the 500 ft² exclusion.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #2162)

2- 273 - (220-4(c)): Accept

SUBMITTER: Roland L. Comeau, Intermountain Power Service Corp.

RECOMMENDATION: Revise as follows:

Range Loads. It shall be permissible acceptable to apply demand factors for range loads in accordance with Table 220-19, including Note 4.

SUBSTANTIATION: Acceptable is not the proper word for a permissive rule. "Shall be permitted and shall be permissible indicate allowed optional or alternate methods." [NEC Style Manual 3.2.5.5 Voltage]; therefore, permissible should be used in this section.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #1748)

2- 274 - (220-5 (New)): Reject

SUBMITTER: Jamie McNamara, Hastings, MN

RECOMMENDATION: Add new text to read as follows:

220-5. Diagrams of service(s). If required by the authority having jurisdiction, a diagram showing service details shall be provided prior to the installation of the service. Such a diagram shall show the area in square feet of the building or other structure supplied by each service, the total connected load before applying demand factors, the demand factors used, the computed load after applying demand factors, and the size and type of conductors to be used.

SUBSTANTIATION: There is a requirement for feeders in article 215-5 that is similar to this one but limited to feeders by the scope of article 215-1. Article 215 covers the installation requirements, overcurrent protection requirements, minimum size, and ampacity of conductors for feeders supplying branch-circuit loads as computed in accordance with Article 220. This requirement would allow the authority having jurisdiction to require a diagram of the service (load calculation) as is currently the case for feeders only. There are a lot of buildings that have a service and branch circuits only and no feeder's as in most dwellings and small commercial buildings and the requirements in 215-5 can not be applied. Please see other proposal on 230-5 and 215-5.

PANEL ACTION: Reject.

PANEL STATEMENT: The requirement for a diagram would not be appropriate in Article 220.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #455)

2- 275 - (220-12(a)): Accept

SUBMITTER: Technical Correlating Committee National Electrical Code

RECOMMENDATION: Revise Section 220-12(a) to read as follows:

"(a) Show Windows. For show-window lighting, a load of not less than 660 volt-amperes/linear meter or 200 volt-amperes/linear foot shall be included for each linear foot (305 mm) of a show window, measured horizontally along its base.

FPN: See Section 220-3(b)(7) for branch circuits supplying show windows."

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.

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The inch-pound numbers are not shown in parenthesis since they are not a direct conversion. Separate loads are given based on linear meters and linear feet.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #3763)

2- 276 - (220-12(b)): Accept

NOTE: The Technical Correlating Committee directs that the panel clarify the action on the proposal, specifying where the new sentence is to be located. This action will be considered by the Panel as a Public Comment.

SUBMITTER: Michael S. O'Boyle, Lightolier, Inc./Rep. American Lighting Assn.

RECOMMENDATION: Add last sentence from 1996 NEC 410-102 and relocate to Part A:

"Track Lighting. For track lighting in other than dwelling units or guest rooms of hotels or motels, an additional load of 150 volt-amperes shall be included for every 2 ft (610 mm) of lighting track or fraction thereof. Where multicircuit track is installed the load shall be considered to be divided equally between the track circuits."

SUBSTANTIATION: This load calculation requirement was relocated to Section 220-12 from Section 410-102 during the 1999 code cycle. The 1996 Section 410-102 requirement addressed both single circuit and multicircuit lighting track. Using that rule, 12 ft of single circuit lighting track would be considered a 900 VA load, each circuit of a 12 ft two-circuit lighting track would be considered a 450 VA load and each circuit of a 12 ft triple-circuit lighting track would be considered a 300 VA load. Presently, Section 220-12 does not address multicircuit lighting track. A98 NEC-ROP and A98 NEC-ROC do not reveal any substantiated reason for deleting the multicircuit calculation provision. Because separate branch circuits may supply a multicircuit lighting track, provisions should be given to separately calculate the load of each track circuit. Also, because the rule is associated with both branch circuits and feeders, it should appear in 220, Part A.

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

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #1153)

2- 277 - (220-14): Accept in Principle in Part

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise text to read:

Motors. Motor loads shall be computed based on maximum current ratings in accordance with Sections 430-24, 430-25, and 430-26, 430-6(a), (b), (c), and (d), and the rated load current or branch-circuit selection current as covered in Section 440-2 for hermetic refrigerant motor-compressors.

SUBSTANTIATION: Sections 430-24, 430-25 and 430-26 do not relate directly to load computations, but conductor ampacity, which is not the same, but separate considerations. This section infers the 25 percent increase for motor supply conductors constitute part of the load, which is misleading and incorrect. Section 430-22(b) should also apply to service and feeder conductors where they supply a motor (no other load) since they see the same heating effects as the branch-circuit portion of the supply conductors. Section 430-26 is deleted as that is a separate section which stands alone, again relating to ampacity, but does not specifically affect computed load. Section 440-2 is referenced as rated load or branch-circuit selection current appears to be the constituted load, as inferred by Sections 440-7, 440-33, and 440-34.

PANEL ACTION: Accept in Principle in Part.

At the end of existing Section 220-14, add "and 440-6 for hermetic refrigerant motor compressors."

The panel rejects the remainder of the proposal.

PANEL STATEMENT: The panel accepts in principle the part of the recommendation referencing a specific section in Article 440. The proper reference is 440-6. The panel rejects the remainder

of the proposal because the references make it clear what rules to use. It is the intent of the panel to use the same rules for motor conductor calculations as load calculations.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #695)

2- 278 - (220-15, Exception): Accept in Part

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

Exception: Where reduced loading of the conductors results from units operating on duty-cycle, intermittently, or from all units not operating at ~~one~~ the same time, the authority having jurisdiction may grant permission for feeder and service conductors to have an ampacity less than 100 percent, provided the conductors have an ampacity sufficient for the load so determined.

SUBSTANTIATION: Editorial. Since service conductors would see the same reduced loading in addition to any other diversity, they should be included. Though service conductors would be computed based on feeder reduced load (normally), the text is a precise statement requiring 100 percent computation and the exception doesn't address the service conductors.

PANEL ACTION: Accept in Part.

The panel accepts the proposal, with the exception of the insertion of the word "sufficient".

PANEL STATEMENT: The word "sufficient" is not necessary, and is not in compliance with 2.2.1 of the NEC Style Manual.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #3239)

2- 279 - (220-16(a)): Reject

SUBMITTER: Edward J. Fox, Jr., Orange County Bldg Div., FL
RECOMMENDATION: Reference to 1996 NEC Article 220-4(b) which has been rewritten, the following should be added at the end of the existing paragraph in 220-16(a):

220-16(a): There shall be a maximum of two duplex receptacles installed on each of the two required small appliance receptacle branch circuits for counter tops in the kitchen.

SUBSTANTIATION: If an electrical contractor wires a residence and does so with the minimum code as is stated in the 1996 NEC, and the 1999 NEC, he would only be required to have two circuits for small appliances in the kitchen area and be in compliance.

With the many different appliances available today, when the customer plugs in a coffee maker, a microwave, a griddle, a toaster, and etc., and all on the same circuit; that circuit breaker will trip due to an overloaded circuit. We feel that this could be unsafe because what the owner might do to correct this problem. Why create an unsafe condition that could be avoided and also have room for expansion later if needed.

The above article provides a higher degree of safety and flexibility for the consumers.

By providing fewer receptacles per circuit, there is less of a chance of any overload or the use of extension cords.

This proposal is very exact as to the requirements of this article.

By adding the loads of typical kitchen equipment it is very apparent that two outlets per circuit provides the additional capacity needed.

By providing a better electrical system up front, the citizens are not impacted by additional cost later due to adding more circuits to handle an ever increasing demand.

People entertain more and spend more time in the kitchen area and have a greater demand for kitchen related equipment.

PANEL ACTION: Reject.

PANEL STATEMENT: Insufficient substantiation has been provided to show that the current requirements are inadequate.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

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(Log #2857)

2- 280 - (220-16(c) (New)): **Reject**
SUBMITTER: Bill F. Neitzel, Madison, WI
RECOMMENDATION: Add new subsection:

(c) **Bathroom Circuit Load.** A load of not less than 1500 volt-amperes shall be included for each 2-wire bathroom branch circuit installed as required by Section 210-11(c) (3). This load shall be permitted to be included with the general lighting load and subjected to the demand factors provided in Table 220-11.
SUBSTANTIATION: The recognition of the loads associated with “bathroom accessories” has prompted Article 210-11 to address these loads with a 20-ampere branch circuit. These loads are substantial enough to warrant being addressed in Article 220. With the increase in the number of bathrooms found in residences, there is also increased loading on services and feeders.

PANEL ACTION: Reject.

PANEL STATEMENT: Insufficient substantiation has been provided to show that the current requirements are inadequate. The load for bathrooms is taken into consideration in Table 220-3(a). The requirement for the 20 ampere circuit for the bathroom does not add any additional load to the feeder or service.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #3819)

2- 281 - (220-18): **Reject**
SUBMITTER: Denise Cribbs, Riviera Electric
RECOMMENDATION: Revise text to read as follows:

“The load for household electric clothes dryers in a dwelling unit shall be 5000 watts (VA) or the nameplate rating whichever is larger for each dryer unless using optional calculation (220-30).”
SUBSTANTIATION: In 220-18 it states to use 5 kw or nameplate rating whichever is greater with no reference optional calculation. Then if you go to 220-30 for optional calculation it tells you to use nameplate rating so which code do you go by?

PANEL ACTION: Reject.

PANEL STATEMENT: Article 220, Part B and Part C are stand-alone sections and should be considered separately. See section 220-30(a).

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #4167)

2- 282 - (Table 220-18): **Reject**
SUBMITTER: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
RECOMMENDATION: Revise the table as follows:

Table 220-18. Demand Factors for Household Electric Clothes Dryers

| Number of Dryers | Demand Factor |
|------------------|---------------------------------------|
| 1-4 | 100% |
| 5 | 85% |
| 6 | 75% |
| 7 | 65% |
| 8 | 60% |
| 9 | 55% |
| 10 | 50% |
| 11 | 47% |
| 12-22 | [47 - (Number of dryers over 11)]% |
| 23 | 35% |
| 24-42 | [35 - 0.5(Number of dryers over 23)]% |
| 43 and over | 25% |

SUBSTANTIATION: Applying the existing table to installations involving 1 through 42 electric clothes dryers results in no fewer than 14 different connected load combinations where a marginal increase of an additional 5 kW clothes dryer results in either no change (one instance) or an actual reduction (13 instances) in the calculated load. In other words, out of the first 42 possible dryer connections, fully one third of them result in a paradoxical load calculation, one in which you reduce, in absolute terms, your calculated load by adding to the connected load. We might entertain this anomaly if correcting it required hopeless complexity. It doesn't. The proposed table has fewer lines than

the one it replaces, and every additional dryer produces an increase in load. Over all, the new table stays right with the basic parameters of the existing table, generally running slightly over the old numbers (in the direction of safety). There are a few instances where it computes slightly below the old values, but not significantly.

The table below shows the paradoxical points in the existing table with asterisks, together with all the possible combinations together with how many kilowatts at which each dryer combination would calculate (based on 5 kW dryers). The worst case shortage is less than 1 kW. In every case, those “shortages” are actually phantoms, because they always occur for the dryer combination just below the point in the old table where you start getting free dryers (additional connected load = lower calculated load).

CMP 2 should take this modest step to produce a better, more coherent and defensible Code. This proposal, along with the one from the Massachusetts Electrical Code Advisory Committee on Table 220-36, essentially rid Article 220 of tables that force users into paradoxical load calculations. They would join Table 220-11, which never had this problem since its inception in the 1950s, and Table 530-19(a), which got rid of its paradoxical calculations in 1990 by this submitter's proposal.

| Number of Clothes Dryers | Table 220-18 Demand Factor | 5.0kW | Proposal Demand Factor | 5.0kW |
|--------------------------|----------------------------|-------|------------------------|-------|
| 1 | 100 | 5.0kW | 100 | 5.0kW |
| 2 | 100 | 10.0 | 100 | 10.0 |
| 3 | 100 | 15.0 | 100 | 15.0 |
| 4 | 100 | 20.0 | 100 | 20.0 |
| 5* | 80 | 20.0 | 85 | 21.3 |
| 6 | 70 | 21.0 | 75 | 22.5 |
| 7 | 65 | 22.8 | 65 | 22.8 |
| 8 | 60 | 24.0 | 60 | 24.0 |
| 9 | 55 | 24.8 | 55 | 24.8 |
| 10 | 50 | 25.0 | 50 | 25.0 |
| 11* | 45 | 24.8 | 47 | 25.9 |
| 12 | 45 | 27.0 | 46 | 27.6 |
| 13 | 45 | 29.3 | 45 | 29.3 |
| 14* | 40 | 28.0 | 44 | 30.8 |
| 15 | 40 | 30.0 | 43 | 32.3 |
| 16 | 40 | 32.0 | 42 | 33.6 |
| 17 | 40 | 34.0 | 41 | 34.9 |
| 18 | 40 | 36.0 | 40 | 36.0 |
| 19 | 40 | 38.0 | 39 | 37.1 |
| 20* | 35 | 35.0 | 38 | 38.0 |
| 21* | 35 | 36.8 | 37 | 38.9 |
| 22 | 35 | 38.5 | 36 | 39.6 |
| 23 | 35 | 40.3 | 35 | 40.3 |
| 24 | 35 | 42.0 | 34.5 | 41.4 |
| 25* | 32.5 | 40.6 | 34 | 42.5 |
| 26 | 32.5 | 42.3 | 33.5 | 43.6 |
| 27 | 32.5 | 43.9 | 33 | 44.6 |
| 28 | 32.5 | 45.5 | 32.5 | 45.5 |
| 29 | 32.5 | 47.1 | 32 | 46.4 |
| 30* | 30 | 45.0 | 31.5 | 47.3 |
| 31* | 30 | 46.5 | 31 | 48.1 |
| 32 | 30 | 48.0 | 30.5 | 48.8 |

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| Number of Clothes Dryers | Table 220-18 Demand Factor | | Proposal Demand Factor | |
|--------------------------|----------------------------|------|------------------------|------|
| | | | | |
| 33 | 30 | 49.5 | 30 | 49.5 |
| 34 | 30 | 51.0 | 29.5 | 50.2 |
| 35* | 27.5 | 48.1 | 29 | 50.8 |
| 36* | 27.5 | 49.5 | 28.5 | 51.3 |
| 37* | 27.5 | 50.9 | 28 | 51.8 |
| 38 | 27.5 | 52.3 | 27.5 | 52.3 |
| 39 | 27.5 | 53.6 | 27 | 52.7 |
| 40* | 25 | 50.0 | 26.5 | 53.0 |
| 41* | 25 | 51.3 | 26 | 53.3 |
| 42* | 25 | 52.5 | 25.5 | 53.6 |
| 43 | 25 | 53.8 | 25 | 53.8 |
| 44 | 25 | 55.0 | 25 | 55.0 |
| 45 | 25 | 56.3 | 25 | 56.3 |

PANEL ACTION: Reject.
PANEL STATEMENT: The existing table is easier to use. No data was provided to substantiate this change, or some of the higher demand factors.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12

(Log #2586)

2- 283 - (Table 220-19): Accept in Principle
SUBMITTER: Donald R. Cook, Southern Section, IAEI
RECOMMENDATION: Revise Table 220-19 as follows.
 (Table shown below)
SUBSTANTIATION: To make the Code more user friendly.
PANEL ACTION: Accept in Principle.
 In the proposed table, move "Demand Factor (Percent) (See Notes)" to be over both columns A and B.
PANEL STATEMENT: Editorial.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12
VOTE ON PANEL ACTION:
AFFIRMATIVE: 12

Table 220-19. Demand Loads for Household Electric Ranges, Wall-Mounted Ovens, Counter-Mounted Cooking Units, and Other Household Cooking Appliances over 1 3/4 kW Rating (Column C to be used in all cases except as otherwise permitted in Note 3.)

| Number of Appliances | Column A (Less than 3 1/2 kW Rating) | Demand Factor (Percent) (See Notes) | | Maximum Demand (kW) (See Notes) Column C (Not over 12 kW Rating) |
|----------------------|---|---|---|---|
| | | Column B (3 1/2 kW to 8 3/4 kW Rating) | Column C (3 1/2 kW to 8 3/4 kW Rating) | |
| 1 | 80 | 80 | 8 | |
| 2 | 75 | 65 | 11 | |
| 3 | 70 | 55 | 14 | |
| 4 | 66 | 50 | 17 | |
| 5 | 62 | 45 | 20 | |
| 6 | 59 | 43 | 21 | |
| 7 | 56 | 40 | 23 | |
| 8 | 53 | 36 | 23 | |
| 9 | 51 | 35 | 24 | |
| 10 | 49 | 34 | 25 | |
| 11 | 47 | 32 | 26 | |
| 12 | 45 | 32 | 27 | |
| 13 | 43 | 32 | 28 | |
| 14 | 41 | 32 | 29 | |
| 15 | 40 | 32 | 30 | |
| 16 | 39 | 28 | 31 | |
| 17 | 38 | 28 | 32 | |
| 18 | 37 | 28 | 33 | |
| 19 | 36 | 28 | 34 | |
| 20 | 25 | 28 | 35 | |
| 21 | 34 | 26 | 36 | |
| 22 | 33 | 26 | 37 | |
| 23 | 32 | 26 | 38 | |
| 24 | 31 | 26 | 39 | |
| 25 | 30 | 26 | 40 | |
| 26-30 | 30 | 24 | 15 kW + 1 kW for each range | |
| 31-40 | 30 | 22 | | |
| 41-50 | 30 | 20 | 25 kW + 3/4 kW for each range | |
| 51-60 | 30 | 18 | | |
| 61 and over | 30 | 16 | | |

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(Log #3444)

2- 284 - (Table 220-19): Accept in Principle
 SUBMITTER: Philip H. Cox, Int'l Assn. of Electrical Inspectors
 RECOMMENDATION: Revise Table 220-19 as follows:

Table 220-19. Demand Loads for Household Electric Ranges, Wall-Mounted Ovens, Counter-Mounted Cooking Units, and Other Household Cooking Appliance over 1 3/4 kW Rating (Column C to be used in all cases except as otherwise permitted Note 3.)

| Number of Appliances | Column A (Less than 3 1/2 kW Rating) | Demand Factor (Percent) (See Notes) | | Maximum Demand (kW) (See Notes) Column C (Not over 1 kW Rating) |
|----------------------|---|---|---|---|
| | | Column B (3 1/2 kW to 8 3/4 kW Rating) | Column C (3 1/2 kW to 8 3/4 kW Rating) | |
| 1 | 80 | 80 | | 8 |
| 2 | 75 | 65 | | 1 |
| 3 | 70 | 55 | | 1 |
| 4 | 66 | 50 | | 1 |
| 5 | 62 | 45 | | 2 |
| 6 | 59 | 43 | | 2 |
| 7 | 56 | 40 | | 2 |
| 8 | 53 | 36 | | 2 |
| 9 | 51 | 35 | | 2 |
| 10 | 49 | 34 | | 2 |
| 11 | 47 | 32 | | 2 |
| 12 | 45 | 32 | | 2 |
| 13 | 43 | 32 | | 2 |
| 14 | 41 | 32 | | 2 |
| 15 | 40 | 32 | | 3 |
| 16 | 39 | 28 | | 3 |
| 17 | 38 | 28 | | 3 |
| 18 | 37 | 28 | | 3 |
| 19 | 36 | 28 | | 3 |
| 20 | 25 | 28 | | 3 |
| 21 | 34 | 26 | | 3 |
| 22 | 33 | 26 | | 3 |
| 23 | 32 | 26 | | 3 |
| 24 | 31 | 26 | | 3 |
| 25 | 30 | 26 | | 4 |
| 26-30 | 30 | 24 | | 15kW+1 kW for each range |
| 31-40 | 30 | 22 | | 25kW+3/4 kW for each range |
| 41-50 | 30 | 20 | | |
| 51-60 | 30 | 18 | | |
| 61 and over | 30 | 16 | | |

SUBSTANTIATION: To make the Code more user friendly.
PANEL ACTION: Accept in Principle.
PANEL STATEMENT: See panel action and statement on Proposal 2-283.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12
VOTE ON PANEL ACTION:
 AFFIRMATIVE: 12

(Log #2587)

2- 285 - (Table 220-19 Notes): Accept in Principle
 SUBMITTER: Donald R. Cook, Southern Section, IAEI
 RECOMMENDATION: Revise text to read as follows:

Notes:
 1) Over 12 kW through 27 kW ranges all of same rating. For ranges individually rated more than 12 kW but more than 27 kW, the Maximum demand of Column C shall be increased 5 percent for each additional kilowatt of rating or major fraction thereof by which the rating of individual ranges exceed 12 kW.
 2) Over 8 3/4 through 27 kW ranges of unequal ratings. For ranges individually rated more than 8 3/4 kW and of different ratings, but none exceeding 27 kW, an average value of rating shall be computed by adding together the ratings of all ranges to obtain the total connected load (using 12 kW for any range rated less than 12 kW) and dividing by the total number of ranges. Then the maximum demand in Column C shall be increased 5 percent for each kilowatt or major fraction thereof by which this average value exceeds 12 kW.
 3) Over 1 3/4 kW through 8 kW. In lieu of the method provided in Column C, it shall be permissible to add the nameplate ratings of all household cooking appliances rated more than 8 3/4 kW and multiply the sum by the demand factors specified in Column A or B for the given number of appliances. Where the rating of cooking appliances for that column and the results added together.

4) Branch-Circuit Load. It shall be permissible to compute the branch-circuit load for one range in accordance with Table 220-19. The branch-circuit load for a counter-mounted cooking unit and not more than two wall-mounted ovens, all supplied from a single branch circuit and located in the same room, shall be computed by adding the nameplate rating of the individual appliance and treating this total as equivalent to one range.

5) This table also applies to household cooking appliances rated over 1 3/4 kW and used in instructional programs.

FPN No. 1: See Table 220-20 for commercial cooking equipment.

FPN No. 2: See the examples in Appendix D.

SUBSTANTIATION: To realign the notes to match new Table 220-19.

PANEL ACTION: Accept in Principle.

Revise the existing code to read as follows:

“Notes: 1. Over 12 kW through 27 kW ranges all of same rating. For ranges individually rated more than 12 kW but not more than 27 kW, the maximum demand in Column C shall be increased 5 percent for each additional kilowatt of rating or major fraction thereof by which the rating of individual ranges exceeds 12 kW.

2. Over 8 3/4 kW through 27 kW ranges of unequal ratings. For ranges individually rated more than 8 3/4 kW and of different ratings, but none exceeding 27 kW, an average value of rating shall be computed by adding together the ratings of all ranges to obtain the total connected load (using 12 kW for any range rated less than 12 kW) and dividing by the total number of ranges. Then the maximum demand in Column C shall be increased 5 percent for each kilowatt or major fraction thereof by which this average value exceeds 12 kW.

3. Over 1 3/4 kW through 8 3/4 kW. In lieu of the method provided in Column C, it shall be permissible to add the nameplate ratings of all household cooking appliances rated more than 1 3/4 kW but not more than 8 3/4 kW and multiply the sum by the demand factors specified in Column A or B for the given number of appliances. Where the rating of cooking appliances falls under both Column A and Column B, the

demand factors for each column shall be applied to the appliances for that column, and the results added together.

4. Branch-Circuit Load. It shall be permissible to compute the branch-circuit load for one range in accordance with Table 220-19. The branch-circuit load for one wall-mounted oven or one counter-mounted cooking unit shall be the nameplate rating of the appliance. The branch-circuit load for a counter-mounted cooking unit and not more than two wall-mounted ovens, all supplied from a single branch circuit and located in the same room, shall be computed by adding the nameplate rating of the individual appliances and treating this total as equivalent to one range.

5. This table also applies to household cooking appliances rated over 1 3/4 kW and used in instructional programs.

FPN No. 1: See Table 220-20 for commercial cooking equipment.
FPN No. 2: See the examples in Appendix D."

PANEL STATEMENT: The panel has corrected the editorial errors in the notes.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #3445)

2-286 - (Table 220-19 Notes): Accept in Principle

SUBMITTER: Philip H. Cox, Int'l Assn. of Electrical Inspectors
RECOMMENDATION: Revise the Notes to Table 220-19 to read:

Notes: 1) Over 12 kW through 27 kW ranges all of same rating. For ranges individually rated more than 12 kW but more than 27 kW, the Maximum demand of Column C shall be increased 5 percent for each additional kilowatt of rating or major fraction thereof by which the rating of individual ranges exceed 12 kW.

2) Over 8 3/4 through 27 kW ranges of unequal ratings. For ranges individually rated more than 8 3/4 kW and of different ratings, but none exceeding 27 kW, an average value of rating shall be computed by adding together the ratings of all ranges to obtain the total connected load (using 12 kW for any range rated less than 12 kW) and dividing by the total number of ranges. Then the maximum demand in Column C shall be increased 5 percent for each kilowatt or major fraction thereof by which this average value exceeds 12 kW.

3) Over 1 3/4 kW through 8kW. In lieu of the method provided in Column C, it shall be permissible to add the nameplate ratings of all household cooking appliances rated more than 8 3/4 kW and multiply the sum by the demand factors specified in Column A or B for the given number of appliances. Where the rating of cooking appliances for that column and the results added together.

4) Branch-Circuit Load. It shall be permissible to compute the branch-circuit load for one range in accordance with Table 220-19. The branch-circuit load for a counter-mounted cooking unit and not more than two wall-mounted ovens, all supplied from a single branch circuit and located in the same room, shall be computed by adding the nameplate rating of the individual appliance and treating this total as equivalent to one range.

5) This table also applies to household cooking appliances rated over 1 3/4 kW and used in instructional programs.

FPN No. 1: See Table 220-20 for commercial cooking equipment

FPN No. 2: See the examples in Appendix D.

SUBSTANTIATION: To realign the note to match the new Table 220-19.

PANEL ACTION: Accept in Principle.

PANEL STATEMENT: See panel action and statement on Proposal 2-285.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #609)

2-287 - (220-19, FPN): Accept in Principle

SUBMITTER: Rick Stringfield, Westinghouse Savannah River Co.
RECOMMENDATION: Remove FPN referring to Example D5(a) and change to a parenthetical statement after the second sentence of the section. Should read:

Where two or more single-phase ranges are supplied by a 3-phase, 4-wire feeder or service, the total load shall be completed on the basis of twice the maximum number connected between any two phases. (See Example D5(a) in Appendix D)

SUBSTANTIATION: Promote understanding. As written, FPN appears to refer to entire section when, in fact, example mentioned only covers 2 or more ranges supplied by 3-phase, 4-wire feeder. Change still maintains code standards and language.
PANEL ACTION: Accept in Principle.

In the existing code, move the third sentence to become the second sentence. Move the current second sentence into a new second paragraph. The fine print note remains unchanged.

PANEL STATEMENT: The revised wording meets the intent of the submitter and provides clarity.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #13)

2-288 - (220-22): Accept in Principle

NOTE: The following proposal consists of Comment 2-162 on Proposal N/A 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.

SUBMITTER: Edwin C. Denham, Denham Consulting Engineers Inc.

RECOMMENDATION: Rewrite the last sentence to read as follows:

There shall be no reduction of:

(a) The neutral capacity for that portion of the load that consists of nonlinear loads,

(b) The grounded conductor of a 3-wire circuit which consists of 2-phase wires and the neutral wire, where the supply is from a 4-wire, 3-phase, wye-connected system.

SUBSTANTIATION: The present sentence is a "run-on" sentence, and is unclear unless read by a textual scholar. The sentence should be diagrammed as submitted or broken into two separate sentences which would add additional text to an already cumbersome article. Some code officials are reading this text as justification of no deration of any neutral in a commercial project etc.

PANEL ACTION: Accept in Principle.

Rewrite the last sentence of the proposed wording into two sentences to read as follows:

"There shall be no reduction of the neutral capacity for that portion of the load that consists of nonlinear loads supplied from a 4-wire, wye-connected, 3-phase system. There shall be no reduction in the capacity of the grounded conductor of a 3-wire circuit consisting of two phase wires and the neutral of a 4-wire, 3-phase, wye-connected system."

PANEL STATEMENT: These are two separate requirements. The wording has been revised to reflect this intent.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #4071)

2-289 - (220-30): Reject

SUBMITTER: David P. Brown, Baltimore Gas and Electric Co./Rep. Edison Electric Inst./Electric Light & Power Group
RECOMMENDATION: This is a companion proposal to change Appendix D, Example No. D2(c).

Change paragraph (c) of 220.30 as follows:

(c) Heating and Air-Conditioning Load. Include the largest of the following ~~six~~ five selections (load in kVA).

(1) 100 percent of the nameplate rating(s) of the air conditioning and cooling including heat pump compressors.

~~(2) 100 percent of the nameplate ratings of the heat pump compressors and supplemental heating unless the controller prevents the compressor and supplemental heating from operating at the same time.~~

(2) ~~(3)~~ 100 percent of the nameplate rating(s) of electric thermal storage and other heating systems where the usual load is expected to be continuous at the full nameplate value. Systems qualifying under this selection shall not be calculated under any other selection in (c).

(3) ~~(4)~~ 65 percent of the nameplate rating(s) of the total central electric space heating including heat pump compressors. If the heat pump compressor is prevented from operating at the same time as the supplementary heat, it does not need to be added to the supplementary heat for the total central space heat load. , including integral supplemental heating in heat pumps where the controller prevents the compressor and supplemental heating from operating at the same time.

(4) ~~(5)~~ 65 percent of the nameplate rating(s) of electric space heating if less than four separately controlled units.

(5) ~~(6)~~ 40 percent of the nameplate rating(s) of electric space heating if four or more separately controlled units.

SUBSTANTIATION: In the 1999 NEC a major change was made in calculations without adequate technical substantiation. This change impacts load calculations for single family dwellings with heat pumps when the compressor and supplemental heating is operating at the same time (normal installation) by counting the central space heat at 100 percent rather than at 65 percent as had been done by the Optional Method since the 1971 NEC. This change was made with no historical load data to justify the change. It significantly increases the main panel size and service entrance conductors on many homes and apartments thus increasing the cost with no improvements in safety. Also, the 1999 calculations are very erratic depending on whether or not the heat pump can be on at the same time as the supplementary heat. Based on the NFPA 70 A98 ROP Proposal 2-319 was rejected because it did not further clarify the present wording. See the NFPA 70 A98 ROP for Comments 2-164 and 2-165 that were accepted in principle as editorial revision to enhance clarity. In Proposal 2-319, the submitter stated that "These changes have no impact on the result of the calculation, only on the format of this section". In reality the example for the Optional Calculation using 220-30 in the 1996 and 1999 NEC is identical except for counting the central electric space heating at 100 percent in the 1999 NEC!

Numerous load surveys have been submitted by various utility companies throughout the years to verify the diversified demand of electric heat. Going back to the 1971 NEC and following codes as well, the key statement was, "Use the larger of the air conditioning load or the diversified demand of the heating load." Using 100 percent for the air conditioning and cooling, including heat pump compressors (from 1971 to 1996) meant that a heat pump could be used for cooling with or without supplemental electric heat and that the summer load could thus be greater than the winter load. Central Electric Space Heating, which was calculated at 65 percent, could include a heat pump compressor as well as integral supplemental heat, i.e., "strip" or electric resistance heat. All of the authors writing books on calculations have included resistance heat at 65 percent. A heat pump is more efficient (lower demand, higher heat output) than straight resistance heat. Also, heat pump systems are designed to turn off the heat pump if the outdoor temperature drops too low preventing continuous operation of the heat pump and the full backup resistance heat. Therefore the diversified demand for a residence would be less if the heat pump and strip heat were on at the same time.

This is exactly opposite to the 1999 changes!! Appendix D Example No. 2(c) of the 1996 NEC added the heat pump load of 5.76 kVA and the 15 kVA and multiplied the total by 65 percent for a total of 13.49 kVA. However, example D2(c) of the 1999 NEC uses a total of 20.76 kVA. The statement that "If supplementary heat is not on at the same time as heat pump, heat pump kVA need not be added to total." would mean that one would use 65 percent of 15 kVA which would be 9.75 kVA. It is reasonable to assume that the winter heat diversified demand is based on the heat loss of the home with a particular thermostat setting. If more electric heat is installed than needed (or it is not divided into two or more stages) then it will just cycle more often, but essentially have the same electrical demand. However, look at the differences in calculations for the 1999 NEC when using a 5 kW heat pump and various amounts of supplemental heat.

| Assume: Diversified Demand | Heat Pump plus | Supplemental | |
|-------------------------------|-------------------|--------------|--------|
| | Supplemental Heat | Heat Only | |
| 1971-96 NEC | 1999 NEC | | |
| | 5 + 15 = 20 kVA | | |
| 13.0 kVA | 20.0 kVA | | 15 kVA |
| 9.75 kVA | 9.75 kVA | | 20 kVA |
| 13.0 kVA | 13.0 kVA | | |
| | 5 + 20 = 25 kVA | | |
| 16.25 kVA | 25 kVA | | 20 kVA |
| 13.0 kVA | 13 kVA | | 25 kVA |
| 16.25 kVA | 16.25 kVA | | |

Thus, based on the 1999 NEC if one uses a 25 kVA central electric heating system with a heat pump, the load is 25 kVA, but if one uses 5 kVA of supplemental heat to replace the heat pump, then the diversified demand drops to 16.25 kVA. If one has 20 kVA of supplemental heat the demand is 13 kVA, but if a 5 kW heat pump is added, the demand jumps to 25 kVA. If one has a 15 kVA system calculated at 9.75 kVA, the demand more than doubles to 20 kVA if a 5 kVA heat pump is added. The 25 kVA heat pump system could actually have a lower demand than the 25 kVA supplemental heat only system that is calculated at 16.25 kVA!!

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

PANEL ACTION: Reject.

PANEL STATEMENT: The current text is a clarification of the technical substantiation from previous cycles. A change in the current text would require new substantiating data.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 11

NEGATIVE: 1

EXPLANATION OF NEGATIVE:

MOORE: The Panel Statement is in error. The current 1999 text clearly was not a clarification of the technical substantiation from previous cycles. This was adequately shown in the substantiation (the same central space heating load for 25 kW can range from 16.25 kW to 25 kW). The current text in the 1999 NEC was a major change without any substantiation. If the substantiation of the 1971 NEC (1. 40 percent of the nameplate ratings of electric space heating for 4 or more separately controlled units; 2. 65 percent of nameplate ratings of electric space heating if less than 4 separately controlled units; and 3. 65 percent of the name plate rating of central electric space heating) was sufficient to use, then it is adequate to justify 65 percent for any type of electric space heating installation. This calculation is for the feeder or service to the dwelling, not a branch circuit. Therefore, it should be obvious that a combination central space heating installation with a heat pump and supplemental heat on at the same time will have a lower demand than a central resistance heat system. The 2002 NEC should revert back to what was in the 1996 NEC if the Panel cannot clarify without making unsubstantiated technical changes.

(Log #14)

2-290 - (220-30(a)): Accept in Part

NOTE: The following proposal consists of Comment 2-166 on Proposal 2-319 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 2-319 was:

Revise Section 220-30. Optional Calculation -- Dwelling Unit, as shown.

(a) Feeder and Service Load. For a dwelling unit having the total connected load served by a single 3-wire, 120/240-volt or 208Y/120-volt set of service-entrance or feeder conductors with an ampacity of 100 or greater, it shall be permissible to compute the feeder and service loads in accordance with Table 220-30 for the loads in (b) and (c) instead of the method specified in Part B of this article. Feeder and service-entrance conductors whose demand load is determined by this optional calculation shall be permitted to have the neutral load determined by Section 220-22.

(b) General Loads. The loads identified in Table 220-30 as "other load" and as "remainder of other load" shall include the following:

(1) 1500 volt-amperes for each 2-wire, 20-ampere small appliance branch circuit and each laundry branch circuit specified in Section 220-16.

(2) 3 volt-amperes per sq ft (0.093 sq m) for general lighting and general-use receptacles.

(3) The nameplate rating of all appliances that are fastened in place, permanently connected, or located to be on a specific circuit, ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers, and water heaters.

(4) The nameplate ampere or kVA rating of all motors and of all low-power-factor loads.

(c) Other Loads. Include the largest of the following five selections in Table 220-30.

(1) 100 percent of the nameplate rating(s) of the air conditioning and cooling, including

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(2) Heat pump compressors and supplemental heating unless the controller prevents both the compressor and supplemental heating from operating at the same time.

(3) 100 percent of the nameplate ratings of electric thermal storage and other heating systems where the usual load is expected to be continuous at the full nameplate value. Systems qualifying under this selection shall not be figured under any other selection in this table.

(4) 65 percent of the nameplate rating(s) of the central electric space heating, including integral supplemental heating in heat pumps where the controller prevents both the compressor and supplemental heating from operating at the same time.

(5) 65 percent of the nameplate rating(s) of electric space heating if less than four separately controlled units.

(6) 40 percent of the nameplate rating(s) of electric space heating of four or more separately controlled units.

Table 220-30. Optional Calculation for Dwelling Unit Load in kVA

- 100 percent of the first 10kVA of all other load.
40 percent of the remainder of all other load.

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Accept in Principle in part (first sentence) revised.

(a) Feeder and Service Load. For a dwelling unit having the total connected load served by a 3-wire, 120/240-volt or 208Y/120-volt set of service entrance or feeder conductors with an ampacity of 100 or greater, or a 4-wire 208Y/120-volt set of service or feeder conductors with an ampacity of 60 or greater, it shall be permissible to compute the service and feeder loads in accordance with Table 220-30 for the loads in (b) and (c) instead of the method specified in Part B of this article.

SUBSTANTIATION: To apply provisions of this section to 4-wire 3-phase systems with a volt-ampere capacity substantially equal to the systems indicated and also to apply the provisions to supply (service) conductors which are not service-entrance conductors, per the Fine Print Note to definition of service-entrance conductors, underground system in Article 100.

PANEL ACTION: Accept in Part.

The panel accepts the deletion of the word "entrance", and rejects the remainder of the proposal.

PANEL STATEMENT: Insufficient substantiation has been provided to extend the optional method to 3-phase services.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #4439)

2- 291 - (220-30(a)): Reject

SUBMITTER: George T. Anderson, Antioch, CA

RECOMMENDATION: Revise text to read as follows:

(a) Feeder and Service Load. For a dwelling unit having the total connected load served by a single 3-wire, 120/240-volt 208Y/120-volt set of service entrance or feeder conductors with an ampacity of 200 or greater.

SUBSTANTIATION: Today's technology and optional appliances have increased our need for extra circuits:

- 1. Electronic equipment performs "cleaner" on its own circuit.
2. Audio equipment as above.
3. Spas of 2 pole 40 to 60 amperes.
4. Landscape and "garden" lighting.
5. Future automotive recharging.

PANEL ACTION: Reject.

PANEL STATEMENT: Insufficient substantiation has been provided to justify a change in the minimum ampacity of the conductors.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #1445)

2- 292 - (220-30(b)(2)): Accept in Principle

SUBMITTER: Barry F. Tower, Patten, ME

RECOMMENDATION: Keep the sentence as is.

Add the following two sentences to read as follows:

"The floor area for each floor including finished basements and unfinished basements adaptable for future use shall be computed

from the outside dimensions of the dwelling unit. The computed floor area shall not include open porches, garages, or unused or unfinished spaces not adaptable for future use.

SUBSTANTIATION: The purpose of this proposal is to clarify what is already the intent of the "code". A previous CMP 2 has already indicated that unfinished basements must be included in the square footage calculations if they are adaptable for future use. Please see the 1995 NEC ROP 2-405.

It should be stated here as well as in 220-3(a). Since this is an "optional" method of calculating loads for dwelling units, it should be able to stand alone without requiring a person to go back to 220-3(a) and find out the meaning of a square foot. These optional calculations (part C) are the most widely used for dwelling units.

I am actually proposing two changes: 1) Adding this square-footage statement to this part of the "code" so that it can stand alone, and 2) I have inserted ten words into the sentence that is not currently in 220-3(a) as follows: "including finished basements and unfinished basements adaptable for future use". I have also submitted a proposal on 220-3(a) to add those same ten words, thus making them similar to each other.

Including the basement or not including the basement when calculating square footage can make a tremendous difference (it can be twice as much). Something this significant should be clarified.

PANEL ACTION: Accept in Principle.

Add a second and third sentence to the existing code text to read as follows:

"The floor area for each floor shall be computed from the outside dimensions of the dwelling unit. The computed floor area shall not include open porches, garages, or unused or unfinished spaces not adaptable for future use."

PANEL STATEMENT: The revised text is extracted from Section 220-3(a). This will provide clarity for this optional calculated method pertaining strictly to dwelling units.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #3898)

2- 293 - (220-30(c)(2)): Reject

SUBMITTER: Leonard L. Johnson, Dept. of Insp, Licenses & Permits, Howard Cnty, MD

RECOMMENDATION: Revise text to read as follows:

(2) 100 percent of the nameplate rating(s) of the heat pump compressors and 65 percent of the supplemental heating unless the controller prevents the compressor and supplemental heating from operating at the same time.

SUBSTANTIATION: If the supplemental heat is interlocked so it will not operate at the same time as the compressor a 65 percent demand is allowed as stated in 220-30(c)(4). If the system is connected so the compressor will operate at the same time as the supplemental heat the only additional load [above that stated in 220-30(c)(4)] that would be added to the service or feeder is the compressor load. 100 percent of the compressor load is the only additional load that could be justified. Note: If 100 percent of the supplemental heat is required in 220-30(c)(2) than 100 percent of the heat should be required in 220-30(c)(4).

PANEL ACTION: Reject.

PANEL STATEMENT: See panel action on Proposal 2-289.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #CP210)

2- 294a - (220-31): Accept

SUBMITTER: Technical Committee on National ECMP 2

RECOMMENDATION: Revise Section 220-31 to read as follows:

"220-31. Optional Calculations for Additional Loads in an Existing Dwelling Unit. This section shall be permitted to be used to determine if the existing service or feeder is of sufficient capacity to serve additional loads. Where the dwelling unit is served by a 120/240-volt or 208Y/120-volt, 3-wire service, it shall be permissible to compute the total load in accordance with (a) or (b).

(a) Where Additional Air-Conditioning Equipment or Electric Space-Heating Equipment is not to be installed. The following formula shall be used for existing and additional new loads.

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Load (kVa) Percent of Load

First 8 kVa of load at 100
 Remainder of load at 40

Load calculations shall include:

(1) General lighting and general-use receptacles at 33 volt-amperes/m² or 3 volt-amperes/ft² as determined by Section 220-3(a).

(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit specified in Section 220-16.

(3) Household range(s), wall-mounted oven(s) and counter-mounted cooking unit(s).

(4) All other appliances that are permanently connected, fastened in place, or connected to a dedicated circuit, at nameplate rating.

(b) Where Additional Air-Conditioning Equipment or Electric Space-Heating Equipment is to be Installed. The following formula shall be used for existing and additional new loads. The larger connected load of air-conditioning or space-heating, but not both, shall be used.

| | |
|--|------|
| Air-conditioning equipment | 100% |
| Central electric space-heating | 100% |
| Less than four separately controlled space-heating units | 100% |
| First 8 kVa of all other loads | 100% |
| Remainder of all other loads | 40% |

Other loads shall include:

(1) General lighting and general-use receptacles at 33 volt-amperes/m² or 3 volt-amperes/ft² as determined by Section 220-3(a).

(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit specified in Section 220-16.

(3) Household range(s), wall-mounted oven(s) and counter-mounted cooking unit(s).

(4) All other appliances that are permanently connected, fastened in place, or connected to a dedicated circuit, including four or more separately controlled space-heating units, at nameplate rating.

SUBSTANTIATION: The entire section has been revised in order to provide clarity.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #697)

2-294 - (220-31): Reject

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise first paragraph to read as follows:

For an existing dwelling unit presently being served by an existing 3-wire 120/240 volt, or 3- or 4-wire 208y/120 volt 3-wire service, it shall be permissible to compute load calculations as follows:

SUBSTANTIATION: Three-phase 4-wire systems are not explicitly prohibited by code and should be included.

PANEL ACTION: Reject.

PANEL STATEMENT: See panel statement on Proposal 2-290.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #705)

2-295 - (220-31(1) through (5)): Accept in Principle in Part

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

(1) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit specified in Section 220-16.

(2) Lighting General lighting and portable appliances general-use receptacles at 3 volt-amperes/ft² (0.093m²)

(3) The nameplate rating of all appliances that are fastened in place, permanently connected, or located to be on a specific circuit, Household range(s), or wall-mounted oven(s) and counter-mounted cooking unit(s), clothes dryers, and water heaters.

(4) ~~All other appliances fastened in place, including four~~ Four or more separately controlled space-heating units, at nameplate ratings.

(5) The nameplate ampere or kVA rating of all motors and of all low power-factor loads.

SUBSTANTIATION: Editorial. Present (1) assigns a 1500 volt-ampere load to all 20-ampere appliance circuits, including appliances fastened in place, permanently connected, etc., not just small appliances and laundry circuits. This is not required elsewhere in the code, and may be inappropriate. Proposed (1) and (3) correlate with the second paragraph.

Present (2) appears intended to apply to general lighting and general-use receptacles as indicated in (b)(2).

Present (3) is not specific whether nameplate ratings as specified in (b)(3) is intended or whether demand factors of Table 220-19 may be used, which would permit a double demand factor. The proposal is more comprehensive.

Proposed (5) covers motors such as pool or spa pumps, etc., which may not be considered appliances, per se and clarifies that such loads (existing or to be added) are included in the 40 percent demand. Application of the demand factor can be critical in determine whether a service is adequate to add a spa or pool pump motor. Section (b)(5) makes it clear that the section permits the 40 percent demand to apply to motors not covered by (b)(3).

PANEL ACTION: Accept in Principle in Part.

The panel accepts the concept of the proposal in principle, however, rejects the proposed wording "(5)".

PANEL STATEMENT: See panel action and statement on Proposal 2-294a.

The proposed (5) is rejected because it is already covered by (4).

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #699)

2-296 - (220-32(a), (c)): Accept in Principle in Part

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

(a) Feeder and Service Load. It shall be permissible to compute the load of a feeder and of service load that supplies more than one dwelling unit of a multifamily dwelling in accordance with Table 220-32 instead of Part B of this article where all the following conditions are met.

(1) No change.

(2) No change

Exception: No change

(3) Each dwelling unit is equipped with either electric space heating or air conditioning, or both. Feeders and service entrance conductors whose demand load is determined by this optional calculation shall be permitted to have the neutral load determined by Section 220-20.

Add new paragraph:

Where dwelling units that do not comply with (1), (2), and (3) are also supplied, that portion of the feeder and service load shall be computed in accordance with Part B of this article.

(c) Connected Computed Loads. The connected computed load to which the demand factors of Table 220-32 apply shall include the following (remainder unchanged).

SUBSTANTIATION: One must infer this section is intended to apply where more than one unit is supplied by the same service or feeder. However, it does not literally exclude application to individual services/feeders for each unit, as permitted by Section 230-2(b)(1).

In (a)(3) there does not appear to be a valid reason to limit neutral load determination to only service-entrance conductors and not include service-laterals and service-drops; demand loads also affect these conductors.

The proposed new paragraph would clarify that this section may apply where some units do not comply with conditions (1), (2) and (3). It may be interpreted by present wording that this is not permitted.

In (c) the loads of (1) and (2) are not "connected" loads but computed loads. A computed load may encompass connected and computed loads.

PANEL ACTION: Accept in Principle in Part.

In the proposal, change (a) to read as follows:

“(a) Feeder or Service Load. It shall be permissible to compute the load of a feeder or service that supplies more than two dwelling units of a multifamily dwelling...”

Revise the second sentence of proposed (3) to read as follows:

“(3) Feeder and Service conductors whose demand...”

The panel rejects the remainder of the proposal.

PANEL STATEMENT: The revisions will correct the discrepancies pointed out by the submitter. The proposed new paragraph is unnecessary as it is already implied. The panel does not accept the revision to (3) (c) as “connected load” is consistent with other parts of the article.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #698)

2- 297 - (220-32(c)): Reject

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise 220-32(c) to read as follows:

The ~~connected~~ computed load to which the demand factors of Table 220-32 apply shall include the following:
(remainder unchanged)

SUBSTANTIATION: Editorial. The loads assigned to small appliance branch circuits, laundry receptacle circuits, general-use receptacle circuits, sign circuits, etc., are not “connected” loads. These circuits have a code-assigned computed load. Nameplate ratings of other utilization equipment which is connected would be included since they are also “computed.”

PANEL ACTION: Reject.

PANEL STATEMENT: The use of the term “connected” is consistent with wording elsewhere in the code.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #700)

2- 298 - (220-33): Reject

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

Optional Calculation Two Dwelling Units. Where ~~two~~ dwelling units of a two-family dwelling are supplied by a single common service or feeder and the computed load under Part B of this article exceeds that for three identical units computed under Section 220-32, the lesser of the two loads shall be permitted to be used.

SUBSTANTIATION: Editorial Clarification. “Two dwelling units” is not definitive; it also covers two one-family dwellings. The definition of dwelling unit does not specify the number of families. Proposal is based on assumption that a two-family dwelling is intended. A single common service that supplies each unit of a two-family dwelling directly by branch circuits should be included.

PANEL ACTION: Reject.

PANEL STATEMENT: Section 220-33 is intended to apply either to a two-family dwelling, or two dwelling units of a multifamily dwelling, not just a two-family dwelling.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

2- 299 - (220-34): Reject

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

Optional Method-Schools. The calculation of a feeder ~~or and~~ service which supplies the total load for a schools building(s) shall be permitted in accordance with Table 220-34 in lieu of Part B of this article where ~~equipped with the feeder or service~~ supplies electric space heating or air conditioning or both, and other loads such as power and lighting. The ~~connected~~ computed load to which the demand factors shall apply include ~~all of the exterior and interior lighting, power, water heating, cooling, other loads, and~~ the larger of the air-conditioning or space heating and all other loads supplied.

Feeders and services ~~entrance conductors~~ whose demand load is determined by this optional calculation shall be permitted to have the neutral load determined by Section 220-22. Where the building or structure load is calculated by this optional method ~~a~~ feeders within the building or structure that does not supply the total load shall have an ampacity as determined in Part B of this article; however, the ampacity of an individual feeder shall not be required to be larger than the ampacity for the feeder or service supply conductors as calculated by this section. ~~entire building.~~

For the purposes of this section, total load shall not include load supplied by a feeder or service of a different class.

This section shall not apply to portable classroom buildings. Table 220-34 Optional Method - Demand Factors for Feeders and services - ~~Entrance Conductors~~
(remainder unchanged)

SUBSTANTIATION: The word “or” between feeder and service can literally suggest a choice of one or the other but not both. Present literal wording of the first sentence indicates a feeder (singular) for schools, which may be comprised of multiple buildings. Revised wording is clear to permit application to one feeder for multiple buildings or separate feeders for each.

This section is not clear whether the feeder or service is intended to supply the total load, as is specified or inferred by similar sections concerning optional calculations, which usually involve diversity. Present wording specifies the school must be “equipped” with electric space heating and/or air conditioning, not that such load must be supplied by the feeder or service being calculated. A feeder or service of one class (e.g. 208y/120 volt 3-phase) supplying the loads indicated, except with no heating or cooling load would qualify if the building is equipped with an air conditioning system supplied by a different class of feeder or service (e.g., 460-volt 3-phase).

“Connected” is changed to “computed” since some loads such as general lighting and general-use receptacles may be computed as unit loads. Such loads and connected loads are “computed”.

The word “service” in the first sentence includes service-equipment, service-entrance, service-drop, and service-lateral conductors, all of which relate to the calculation. The second paragraph limits Section 220-22 to service-entrance conductors which doesn’t correlate with that section which uses the encompassing word “service”.

“All other loads supplied” obviates the need for listing specific loads, and includes interior or exterior loads. Air conditioning equipment is frequently located other than within a building, such as on the roof or in a side yard, which the literal present wording does not include.

“Feeders within the building” appears intended to apply to feeders derived from the service or feeder supply conductors to the building and which supply only a portion of the total load. The proposal attempts to make that clearer. The ampacity of such feeders is not “permitted” by Part B but required (Sections 220-1, 220-10).

The proposed third paragraph would permit application of this section to feeders or services of different classes which do not supply the total load but would otherwise qualify

PANEL ACTION: Reject.

PANEL STATEMENT: The proposal does not improve clarity.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

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(Log #456)

2- 300 - (Table 220-34): Accept in Principle
SUBMITTER: Technical Correlating Committee National
 Electrical Code
RECOMMENDATION: Replace Table 220-34 with the following table:

Table 220-34. Optional Method — Demand Factors for Feeders and Service-Entrance Conductors for Schools

| Connected Load (VA/m ²) | Connected Load (VA/ft ²) | Demand Factor (Percent) |
|--|---|----------------------------|
| The first 33 VA m ² at Plus, Over 33 to 220 VA m ² at Plus, Remainder over 220 VA m ² at | The first 3 VA/ft ² at Over 3 to 20 VA ft ² at Remainder over 20 VA/ft ² at | 100 75 25 |

SUBSTANTIATION: The proposed revision is intended to comply with the NFPA No. 1M Manual of Style Section 4.1 with respect to values of measurement. The inch-pound numbers are not shown in parenthesis since they are not a direct conversion. Separate connected loads are given based on square feet and square meters.

PANEL ACTION: Accept in Principle.
 In the table, insert slashes after "VA" in 4 places. In addition, add the word "plus" in two places as it is shown in the first column.

PANEL STATEMENT: The panel accepts the proposal with editorial revisions.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12
VOTE ON PANEL ACTION:
 AFFIRMATIVE: 12

safely below the maximum design number. The NEC requires that the Nameplate rating of the motor be used for load calculations. In general practice the measured load for many of these units will be 60 percent - 70 percent of nameplate rating. This difference is cumulative throughout the electrical system and results in a calculated number that is approximately 50 percent higher than actual. Prudent engineering adds a margin of safety on top of this number which then results in a system design that is approaching twice the actual demand load. The purpose of electrical calculations is to accurately predict the peak demand. A summation of actual demand provides the most accurate information that can be obtained.

Lighting loads are an example of an existing load that can be effectively isolated for purposes of measurement. If an entire lighting system can be operated independent of all other loads, the instantaneous measurement provides the best available information on this portion of the total load and eliminates the need to count and document hundreds of individual light fixtures.

PANEL ACTION: Reject.
PANEL STATEMENT: The panel does not understand how this would apply to a typical office building or retail business due to the nature of the equipment and appliances involved.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12
VOTE ON PANEL ACTION:
 AFFIRMATIVE: 12

(Log #419)

2- 301 - (220-35): Reject
SUBMITTER: Jack D. Echols, Baltes/Valentino California, Inc.
RECOMMENDATION: Add to 220-35:
 "When adding load to a generator, the weekly log of generator peak loads may be used in lieu of a high kw demand provided the load is established at 125 percent of peak similar to the high kw demand value. Loads shall be determined during full load testing procedures and recorded as called for by 700-4(d) and 700-4(e) and certified by the building owner by a competent representative or building official."

SUBSTANTIATION: Problem: The local authority has no legal means to permit adding loads to an existing generator except by interpretation, something many of them are reluctant to use.
PANEL ACTION: Reject.
PANEL STATEMENT: The appropriate sections of Chapter 7 are clear in their application and should be used. The recommendation could create a conflict with the basic requirement of 700-5(a) that requires the generator to have capacity to supply all emergency loads simultaneously.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12
VOTE ON PANEL ACTION:
 AFFIRMATIVE: 12

(Log #4279)

2- 302 - (220-35, Exception): Reject
SUBMITTER: Stan Price, Electric League of the Pacific Northwest
RECOMMENDATION: Section 220-35.
 Paragraph 1, Exception.
 Add a second paragraph as follows:
 "Loads that do not vary with time or that can be operated at their maximum load, such as motors driving mechanical equipment or lighting systems, shall be permitted to be measured instantaneously."
SUBSTANTIATION: Loads that do not vary with time or that can be operated at their maximum load, such as motors driving mechanical equipment or lighting systems, do not benefit from recordings lasting 30 days.
 Motor driven equipment generally is designed to a calculated maximum design horsepower, is then equipped with the next higher standard motor horsepower rating above the maximum design requirement, and then applied in applications that are

(Log #619)

2- 303 - (220-35(1), Exception): Reject
SUBMITTER: Bruce Fairweather, Electrical Safety Inc.
RECOMMENDATION: Sixth line. after the words "ammeter or", delete the term "power meter".
SUBSTANTIATION: Many electricians use the utility billing demand data to determine existing loading. Unless there is power factor correction the use of a power meter is not going to provide the detail required for determining existing loads.
 The electric utility tariff details the rolling average demand time used for billing. Normally I have found industrial plants on fifteen minute rolling averages and commercial users on thirty minute averages. From a billing demand perspective there isn't much difference in these kilowatt over time measurements. Where we all miss the boat is where there is a large amount of inductive load (rarely do we find a problem due to capacitance) and a corresponding low power factor. Most power meters, like utility demand meters measure KW. In my years in the utility business it was not unusual to have a service burn down due to overload although the demand meter was registering a KW in range of the amperage of the service conductors. This was a major problem with small grocery stores that continued to add refrigeration units to their electric plant. Come summer their demand diversity became non-existent. Coupled with an already low power factor it was not unusual to find that a 50 KW billing demand was actual.
PANEL ACTION: Reject.
PANEL STATEMENT: There are many types of devices that can be employed to achieve the end results. The term "power meters" includes kVA meters.
NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:
AFFIRMATIVE: 12

(Log #702)

2- 304 - (220-36): Accept in Part

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

Optional Calculation ~~New~~ restaurants. Calculation of a service load or feeder load, where the service or feeder serves the total load for a ~~new~~ restaurant shall be permitted in accordance with Table 220-36 in lieu of Part B of this article.

The overload protection of the service ~~entrance~~ conductors shall be in accordance with Sections 230-90 and 240-3.

Feeder conductors shall not be required to be of greater ampacity than the service ~~entrance~~ conductors.

Service ~~entrance~~ or feeder conductors whose demand load is determined by this optional calculation shall be permitted to have the neutral load determined by Section 220-22.

Table 220-36 Optional Method-Demand Factors for Service ~~Entrance~~ and Feeder Conductors for ~~New~~ Restaurants (remainder of table unchanged)

Note: Add all electrical loads, including both electric space heating and air conditioning ~~cooling~~ loads to compute the total connected computed load.

SUBSTANTIATION: There doesn't seem to be a safety reason to limit this section to new restaurants. It should be just as applicable for existing restaurants where remodeling/rewiring takes place.

Electrical wiring doesn't discern any difference.

The first sentence refers to service load, which includes service-drops, service laterals, and service equipment, then three ensuing paragraphs are limited to specific types of service conductors.

There is a pertinent relationship to these other designated types of service conductors. Section 230-90 relates overload protection to (ALL) service conductors.

There is no text which clearly identifies specific type heating and cooling loads specified in the table note and an inference is required. Specificity would be helpful to code users.

PANEL ACTION: Accept in Part.

The panel accepts the deletion of the word "entrance" in 4 places.

The panel accepts the revision of "service load or feeder" to "service or feeder load".

The panel rejects the remainder of the proposal.

PANEL STATEMENT: Insufficient substantiation has been provided to justify extending the optional method to rewiring existing restaurants. The panel rejects the revision to the "Note" because all heating and cooling loads must be included.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #4168)

2- 305 - (Table 220-36): Accept in Principle

SUBMITTER: Frederic P. Hartwell, Hartwell Electrical Services, Inc./Rep. Massachusetts Electrical Code Advisory Committee

RECOMMENDATION: Revise the title and the body of the table to read as follows. (Table shown below)

SUBSTANTIATION: It isn't often that an improvement in technical accuracy can be combined with an increase in simplicity and usability. This proposal provides just that. By simply carrying out the calculations in the corresponding proposal submitted in the 1999 cycle ahead of time for the user, the relevant load calculations can be done with a single multiplication, as given in the revised table. Even the original proposal submitters agree that the methodology in the original proposal was technically accurate and fairly represented their data plots presented to the panel.

This user-friendly proposal involves only four break points instead of six, and completely avoids the paradoxical sizing problem that has caused seminar and application questions across the country. Remember, the reason for going to six rows in the 1996 NEC was to avoid problems involved when the paradoxical load problem crossed standard switch sizes. The problem remains in the 1999 NEC, where a 324 kVA would require an 80% demand factor (720A on a 208Y/120V system), but a 326 kVA similar restaurant saves 86A on its feeder calculation by adding the additional load. This proposal is a much simpler approach that avoids the problem entirely.

The panel objected to the lack of substantiation for this table in the previous comment period. By that logic, Table 220-36 shouldn't be in the Code, since the data supporting this table is the identical data that the restaurant group and EPRI used in the original submittal. For clarity on this point please find enclosed the data as plotted by EPRI as part of the original submittal for the 1996 cycle, with various test plots analyzed on the margins of the calculation cut points. This methodology fits the data curves just as well as the original 1996 NRA/EPRI/EEI proposal, with no paradoxical results on feeder calculations. This revised table has been in the Massachusetts Electrical Code ever since without any reported objections.

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

PANEL ACTION: Accept in Principle.

PANEL STATEMENT: The panel accepts the submitter's revision in addition to the revisions made in Proposal 2-304.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #706)

2- 306 - (220-40(a)): Accept

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise last sentence to read as follows:

Where the dwelling has electric heat and the farm has electric grain drying systems, Part C of this article shall not be used to compute the dwelling load where the dwelling and farm load are supplied by a common service.

SUBSTANTIATION: Editorial. Where separate services are provided in accordance with Section 230-2(d), this restriction does not appear to be necessary.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

Table 220.36. Optional Method—Permitted Load Calculations for Service-Entrance and Feeder Conductors for New Restaurants

| Total Connected Load (kVA) | All Electric Restaurant Calculated Loads (kVA) | Not All Electric Restaurant Calculated Loads (kVA) |
|----------------------------|--|--|
| 0 - 200 | 80% | 100% |
| 201 - 325 | 10% (amount over 200) + 160.0 | 50% (amount over 200) + 200.0 |
| 326 - 800 | 50% (amount over 325) + 172.5 | 45% (amount over 325) + 262.5 |
| Over 800 | 50% (amount over 800) + 410.0 | 20% (amount over 800) + 476.3 |

(The note remains as in the 1999 NEC without change.)

(Log #703)

2- 307 - (220-40(b)): Accept in Principle
 SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise to read as follows:

(b) Other than Dwelling Unit. For each farm building or load supplied by where a service or feeder is installed to supply two or more separate branch circuits, the load for feeders and services ~~service entrance conductors and service equipment~~ shall be computed in accordance with demand factors not less than indicated in Table 220-40.

(FPN): No change.

SUBSTANTIATION: Editorial. The present wording infers the supply to a farm building may be two or more branch circuits. Section 225-8(a) limits such supply to one branch circuit, with 6 exceptions. If application of any exception involves a separate service there could be two or more branch circuits, but supplied by different services, and the table demand factors shouldn't be applicable.

This section does not literally apply to service-laterals and service drops. The proposed word "service" encompasses all such supply conductors and service equipment.

PANEL ACTION: Accept in Principle.

Revise the existing code text to read as follows:

"(b) Other Than Dwelling Unit. Where a feeder or service supplies a farm building or other load having two or more separate branch circuits, the load for feeders, service conductors, and service equipment..."

PANEL STATEMENT: The revised wording meets the intent of the submitter and provides clarity.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

(Log #704)

2- 308 - (220-41): Accept

SUBMITTER: Dan Leaf, Palmdale, CA

RECOMMENDATION: Revise first sentence to read as follows:

Where supplied by a common service ~~The~~ the total load of the farm for service ~~entrance~~ conductors and service equipment shall be computed in accordance with the farm dwelling unit load and demand factors specified in Table 220-41.

SUBSTANTIATION: Editorial. This section appears intended to apply where dwelling unit and farm loads are supplied by a common service, but not where separate services are provided. The computed load should also apply to service-lateral and service drop conductors.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 12

VOTE ON PANEL ACTION:

AFFIRMATIVE: 12

ARTICLE 225 — OUTSIDE BRANCH CIRCUITS AND FEEDERS

(Log #515)

4- 2 - (225): Accept

SUBMITTER: Technical Correlating Committee National Electrical Code

RECOMMENDATION: 1. In Section 225-4, replace "10 ft (3.05 m)" with "3.0 m (10 ft)".

2. In Section 225-6(a)(1), replace "50 ft (15.2 m)" with "15 m (50 ft)".

3. In Section 225-6(b), replace "40 ft (12.2 m)" with "12 m (40 ft)".

4. In Section 225-7(c), replace "3 ft (914 mm)" with "900 mm (3 ft)".

5. In Section 225-14(c), replace "4 in. (102 mm)" with "100 mm (4 in.)".

6. In Section 225-14(d), replace "1 ft (305 mm)" with "300 mm (1 ft)".

7. In Section 225-14(d)(1), replace "30 in. (762 mm)" with "750 mm (30 in.)".

8. In Section 225-14(d)(2), replace "24 in. (610 mm)" with "600 mm (24 in.)" and replace "30 in. (762 mm)" with "750 mm (30 in.)".

9. In Section 225-18, replace "10 ft (3.05 m)" with "3.0 m (10 ft)"; "12 ft (3.66 m)" with "3.7 m (12 ft)"; "15 ft (4.57 m)" with "4.5 m (15 ft)"; and "18 ft (5.49 m)" with "5.5 m (18 ft)".

10. In Section 225-19(a), replace "8 ft (2.44 m)" with "2.5 m (8 ft)" and replace "3 ft (914 mm)" with "900 mm (3 ft)".

11. In Section 225-19(a) Exception No. 2, replace "4 in. (102 mm)" with "100 mm (4 in.)"; "12 in. (305 mm)" with "300 mm (12 in.)"; and "3 ft (914 mm)" with "900 mm (3 ft)".

12. In Section 225-19(a) Exception No. 3, replace "18 in. (457 mm)" with "450 mm (18 in.)"; "6 ft (1.83 m)" with "1.8 m (6 ft)"; and "4 ft (1.22 m)" with "1.2 m (4 ft)".

13. In Section 225-19(a) Exception No. 4, replace "3 ft (914 mm)" with "900 mm (3 ft)".

14. In Sections 225-19(b), (c) and (d), replace "3 ft (914 mm)" with "900 mm (3 ft)" throughout.

15. In Section 225-19(e), replace "50 ft (15.2 m)" with "15 m (50 ft)"; "6 ft (1.83 m)" with "1.8 m (6 ft)"; and "8 ft (2.44 m)" with "2.5 m (8 ft)".

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 SI units as the preferred and inch-pound units immediately following.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 11

VOTE ON PANEL ACTION:

AFFIRMATIVE: 11

(Log #351)

4- 3 - (225-1): Reject

SUBMITTER: Kenneth W. Birringer, University of Michigan/Rep. Univ. of Michigan Facilities Planning and Design

RECOMMENDATION: Revise to read as follows:

"This article covers requirements for outside branch circuits and feeders run on or between buildings, structures, or poles on the premises or on a multi-building campus-style complex; and electric ... or poles."

SUBSTANTIATION: With the exception of a few sections, the NEC is based on a model of a single utility service supplying a single premises. This proposed change combined with two others provides means by which the Authority Having Jurisdiction can apply the NEC with consistency to non-utility, inter-building power distribution systems at multi-building campus-style complexes including universities and industrial complexes.

PANEL ACTION: Reject.

PANEL STATEMENT: There is no evidence that the existing wording has caused confusion in the application of the Code rules. The concept is already covered by the scope of Article 225.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 11

VOTE ON PANEL ACTION:

AFFIRMATIVE: 11

(Log #CP407)

4- 3a - (225-2): Accept

SUBMITTER: CMP 4

RECOMMENDATION: Add "Table 225-2 Other Articles" above the existing list of articles.

Amend the existing text to read: "225-2. Other Articles. Application of other articles, including additional requirements to specific cases of equipment and conductors, are shown in Table 225-2."

SUBSTANTIATION: To conform with the NFPA NEC Style Manual.

PANEL ACTION: Accept.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 11

VOTE ON PANEL ACTION:

AFFIRMATIVE: 11