EXHIBIT 47

PROPOSED AMENDMENT TO:
2008 NATIONAL ELECTRICAL CODE
(NFPA 70)

Section 210.5

CURRENT CODE LANGUAGE:

210.5 (C) Identification for Branch Circuits

Ungrounded Conductors. Where the premises wiring system has branch circuits supplied from more than one nominal voltage system, each ungrounded conductor of a branch circuit shall be identified by phase or line and system at all terminations, connection, and splice points. The means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means. The method utilized for conductors originating within each branch-circuit panelboard or similar branch-circuit distribution equipment shall be documented in a matter that is readily available or shall be permanently posted at each branch-circuit panelboard or similar branch-circuit distribution equipment.

PROPOSED CODE LANGUAGE:

210.5 (C) Identification for Branch Circuits

Ungrounded Conductors. Where the premises wiring system has branch circuits supplied from more than one nominal voltage system, each ungrounded conductor of a branch circuit, where accessible, shall be identified by system at all terminations, connection, and splice points. The means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means. The method utilized for conductors originating within each branch-circuit panelboard or similar branch-circuit distribution equipment shall be documented in a matter that is readily available or shall be permanently posted at each branch-circuit panelboard or similar branch-circuit distribution equipment.

SUBSTANTIATION:

The language "phase or line and system at all terminations, connection, and splice points" in this section, will be greatly complicate the branch wiring when already installed in junction boxes or terminated in end use equipment (i.e. … receptacles, switches, lights, motors heating equipment). At this point in the project construction, the ceilings and walls are finished.

The issue at hand is the trade practice of load balancing the three phases in the panelboards, per NFPA 70 section 210.11 (B) Load Evenly Proportion Among Branch Circuits. This is done when the building owner equipment is powered up along with all the electrical usage equipment. Electricians take current measurements between the three phase feeder conductors feeding the panel, to see if any particular phase has higher draw than the others. If this is the case, then branch circuit conductor are swapped between the higher phases with the one that has the least. The goal is to get all three to be a close to the same current level as possible.

The problem with the language "phase or line and system at all terminations, connection, and splice points" is that in the process of providing balance to the panelboard, the electrician would have to remove every receptacle, switch, junction box, and light on the circuits that were swapped during the load balancing procedure and re-identify the conductors.

Remember, at this point, the building finishes are complete. This may require the removal of ceiling tiles to get back to all terminations, connection, and splice points.

The Code language does state "the means of identification shall be permitted to be by separate color coding, marking tape, tagging or other approved means". Due to longevity, approximately 99% of the electricians in NH use the method of color coding with marking tape. The code does not instruct on the colors that will be used but, like in all trades, a common practice or rule of thumb has been derived through the years.

The color code that 99% of electricians use is as follows:

120/208 Voltage System	277/480 Voltage System
Black	Brown
Red	Orange
Blue	Yellow

If the language of phase or line is part of the code section, then above colors would need to be assigned to particular phase as described below:

120/208 Voltage System	277/480 Voltage System
Phase A Black	Phase A Brown
Phase B Red	Phase B Orange

Phase C Blue Phase C Yellow

The language "phase or line and system at all terminations, connection, and splice points" does not provide any additional safety to an installation. The only people who are authorized by RSA-319 C:1 to work on all terminations, connection and splice points are electricians licensed by the Electricians Board. Knowing a branch conductor is of a certain voltage system is the most important identification of the conductor.

The proposed code language will still require the identification by voltage system where accessible.

FISCAL IMPACT:

Undetermined.

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February 4, 2008

Chairman Robert Clegg
NH State Building Code Review Board
10 Hazen Drive
Concord NH 03302

RE: **Proposed Amendment to the**
2008 National Electrical Code NFPA 70
Section 210.5 (C)

Mr. Chairman,

Please have the NH State Building Code Review Board review the proposed amendment to the 2008 National Electrical Code (NFPA 70) Section 210.5 (C).

2008 NFPA 70 Code Language --

210.5 (C) Identification for Branch Circuits
Ungrounded Conductors. Where the premises wiring system has branch circuits supplied from more than one nominal voltage system, each ungrounded conductor of a branch circuit shall be identified by <u>phase or line and</u> system at all terminations, connection, and splice points. The means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means. The method utilized for conductors originating within each branch-circuit panelboard or similar branch-circuit distribution equipment shall be documented in a manner that is readily available or shall be permanently posted at each branch-circuit panelboard or similar branch-circuit distribution equipment.

RE: Proposed Amendment to
2008 National Electrical Code NFPA 70 Section 210.5(C)

Proposed Code Language --

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Ungrounded Conductors. Where the premises wiring system has branch circuits supplied from more than one nominal voltage system, each ungrounded conductor of a branch circuit, where accessible, shall be identified by system at all terminations, connection, and splice points. The means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means. The method utilized for conductors originating within each branch-circuit panelboard or similar branch-circuit distribution equipment shall be documented in a manner that is readily available or shall be permanently posted at each branch-circuit panelboard or similar branch-circuit distribution equipment.

Substantiation --

The language "phase or line and system at all terminations, connection, and splice points" in this section, will greatly complicate the branch wiring when already installed in junction boxes or terminated in end use equipment (ie… receptacles, switches, lights, motors, heating equipment). At this point in the project construction, the ceilings and walls are finished.

The issue at hand is the trade practice of load balancing the three phases in the panelboards, per NFPA 70 section 210.11 (B) Load Evenly Proportion Among Branch Circuits. This is done when the building owner equipment is powered up along with all the electrical usage equipment. Electricians take current measurements between the three phase feeder conductors feeding the panel, to see if any particular phase has higher draw than the others. If this is the case, then branch circuit conductor are swapped between the higher phases with the one that has the least. The goal is to get all three to be as close to the same current level as possible.

The problem with the language "phase or line and system at all terminations, connection, and splice points" is that in the process of providing balance to the panelboard, the electrician would have to remove every receptacle, switch, junction box, and light on the circuits that were swapped during the load balancing procedure and re-identify the conductors.

Remember, at this point, the building finishes are complete. This may require the removal of ceiling tiles to get back to all terminations, connection, and splice points.

RE: Proposed Amendment to
2008 National Electrical Code NFPA 70 Section 210.5(C)

The code language does state "the means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means". Due to longevity, I would say 99 % of the electricians in our State use the method of color coding with marking tape. The code does not instruct on the colors that will be used but, like in all trades, a common practice or rule of thumb has been derived through the years.

The color code that 99% of electricians use is as follows:

120/208Voltage System	277/480 Voltage System
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If the language of <u>phase or line</u> is part of the code section, then above colors would need to be assigned to particular phase as described below:

120/208Voltage System	277/480 Voltage System
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The language "<u>phase or line and</u> system <u>at all terminations, connection, and splice points"</u> does not provide any additional safety to an installation. The only people who are authorized by RSA- 319 C:1 to work on <u>all terminations, connection, and splice points</u> are electricians licensed by the Electricians Board. Knowing a branch conductor is of a certain voltage system is the most important identification of the conductor.

The proposed code language will still require the identification by voltage system where accessible.

If you have any questions concerning the above amendment, please contact my office.

Henry J. Szumiesz
Sales/Estimator

CC Robert Longchamps, President / Kevin Duffy, Vice President

cluding using three wires to do the work of four (in place of two 2-wire circuits), less raceway fill, easier balancing and phasing of a system, and less voltage drop. See the commentary following 215.2(A)(3), FPN No. 3, for further information on voltage drop for branch circuits.

Multiwire branch circuits may be derived from a 120/240-volt, single-phase; a 208Y/120-volt and 480Y/277-volt, 3-phase, 4-wire; or a 240/120-volt, 3-phase, 4-wire delta system. Section 210.11(B) requires multiwire branch circuits to be properly balanced. If two ungrounded conductors and a common neutral are used as a multiwire branch circuit supplied from a 208Y/120-volt, 3-phase, 4-wire system, the neutral carries the same current as the phase conductor with the highest current and, therefore, should be the same size. The neutral for a 2-phase, 3-wire or a 2-phase, 5-wire circuit must be sized to carry 140 percent of the ampere rating of the circuit, as required by 220.61(A) Exception. See the commentary following 210.4(A), FPN, for further information on 3-phase, 4-wire system neutral conductors.

If loads are connected line-to-line (i.e., utilization equipment connected between 2 or 3 phases), 2-pole or 3-pole circuit breakers are required to disconnect all ungrounded conductors simultaneously. In testing 240-volt equipment, it is quite possible not to realize that the circuit is still energized with 120 volts if one pole of the overcurrent device is open. See 210.10 and 240.20(B) for further information on circuit breaker overcurrent protection of ungrounded conductors. Other precautions concerning device removal on multiwire branch circuits are found in the commentary following 300.13(B).

210.5 Identification for Branch Circuits

(A) Grounded Conductor The grounded conductor of a branch circuit shall be identified in accordance with 200.6.

(B) Equipment Grounding Conductor The equipment grounding conductor shall be identified in accordance with 250.119.

(C) Ungrounded Conductors Where the premises wiring system has branch circuits supplied from more than one nominal voltage system, each ungrounded conductor of a branch circuit, where accessible, shall be identified by system. The means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means and shall be permanently posted at each branch-circuit panelboard or similar branch-circuit distribution equipment.

The requirement to identify ungrounded branch circuit conductors has been expanded in the 2005 *Code* to cover all-branch circuit configurations and is not applicable to only multiwire circuits. As was the case in the 2002 edition, the identification requirement applies only to those premises that have more than one nominal voltage system supplying branch circuits (e.g., a 208Y/120-volt system and a 480Y/277-volt system). Unlike the requirement of 200.6(D) for identifying the grounded conductors supplied from different voltage systems, application of this revised rule for identification of the ungrounded conductors does not depend on the different system conductors being installed in the same raceway, cabinet, or enclosure.

The method of identification can be unique to the premises, and although color coding is a popular method, other types of marking or tagging are acceptable alternatives. It is intended that whatever method of identification is used it be consistent throughout the premises. To that end, the identification legend is required to be posted at each branch circuit panelboard or other equipment from which branch circuits are supplied. The expansion of this requirement is based on the need to provide a higher level of safety for personnel working on premises electrical systems with multiple supply voltages.

Exhibit 210.3 shows an example of two different nominal voltage systems in a building. Each ungrounded system conductor is identified by color-coded marking tape. A notice indicating the means of the identification is permanently located at each panelboard. It should be noted that this requirement now applies to all ungrounded branch circuit conductors.

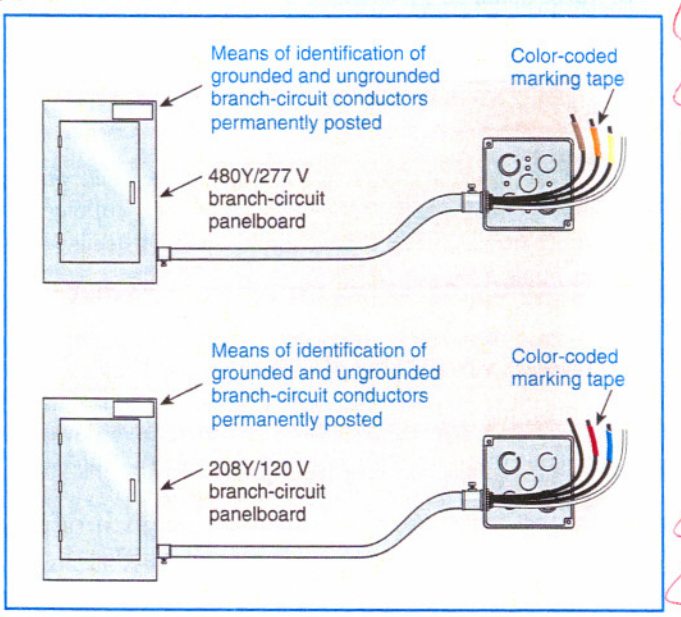

Exhibit 210.3 Examples of accessible (ungrounded) phase conductors identified by marking tape.

210.6 Branch-Circuit Voltage Limitations

The nominal voltage of branch circuits shall not exceed the values permitted by 210.6(A) through 210.6(E).