FORM FOR PROPOSAL FOR 2014 NATIONAL ELECTRICAL CODE®

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Type or print **legibly** in **black** ink. Use a separate copy for each proposal. Limit each proposal to a **SINGLE** section. All proposals **must be received by NFPA by 5 p.m., EST, Friday, November 4, 2011**, to be considered for the 2014 National Electrical Code. Proposals received after 5:00 p.m., EST, Friday, November 4, 2011, will be returned to the submitter. If supplementary material (photographs, diagrams, reports, etc.) is included, you may be required to submit sufficient copies for all members and alternates of the technical committee.

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Please indicate organization represented (if any) PV INDUSTRY FORUM

1. Section/Paragraph 705.95(A)

2. Proposal Recommends (check one): ☐ new text ☒ revised text ☐ deleted text

3. Proposal (include proposed new or revised wording, or identification of wording to be deleted): [Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).]

Revise 705.95(A) as follows:

705.95 Ampacity of Neutral Conductor. The ampacity of the neutral conductors shall comply with either (A) or (B)

(A) Neutral Conductor for Single Phase, 2-Wire Inverter Output. ~~If a single-phase, 2-wire inverter output is connected to the neutral conductor and one the ungrounded conductor (only) of a 3-wire or of a 3-phase 4-wire, wye-connected system, the maximum load connected between the neutral conductor and any one ungrounded conductor plus the inverter output rating shall not exceed the ampacity if the neutral conductor.~~ Where the outputs of single or multiple single-phase inverter(s) are connected between the neutral conductor and one or more of the ungrounded conductors of a 3-phase 4-wire, wye-connected system or a 120/240V single-phase system, the ampacity of the neutral conductor shall be no less than the greater of (1) or (2)

(1) 125% of the continuous load plus 100% of the noncontinuous load on that neutral conductor or

(2) 125% of the sum of the rated output current of all inverters considering worst-case unbalance.

(B) NO CHANGE.

4. Statement of Problem and Substantiation for Proposal: (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Proposal, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

This section applies to the neutral of a feeder (note the word "system" in the existing text). These two currents ((1) and (2)) are *not* additive in this requirement because they may exist separately at different times. The existing requirement, as written, is incorrect in requiring the sum of these two currents to be used. Since the currents (power) will generally flow in opposite directions, the sum may be near zero at times.

If the inverters are not operating, the neutral must be able to carry any connected load currents. The operation of the inverters in the presence of load currents will tend to decrease currents in the neutral. If there are no loads, then the circuit must carry the full rated output of the inverter(s). Where multiple inverters are installed and connected phase-to-neutral, consideration must be given to situations where one or more inverters could fail, be turned off, or the connected array shaded thus eliminating any balance between the phases and increasing the neutral currents. The 125% of rated output is needed to ensure that the neutral conductor ampacity is consistent with the ampacity calculated elsewhere in the Code.

The circuit should be sized for the largest of the two currents.

Example:

480/277V, 3-phase, 4-wire, wye system: Existing maximum, connected, unbalanced load current in the neutral is 40 amps. Two 7 kW inverters are connected between each phase and neutral. A total of six inverters are connected. Rated output current of each inverter is 27.3 amps. When all six inverters are producing rated current, the neutral currents from the inverters are near zero. In a worst-case situation, only two inverters connected on one phase are working at rated output and the others are shut off or have failed. The currents in the neutral from these two inverters would total 2 x 27.3 amps or 54.6 amps, and this should be used to calculate the required ampacity for the neutral, since it is larger than the 40 amps of load current.

5. Copyright Assignment

(a) ☒ **I am the author of the text or other material (such as illustrations, graphs) proposed in the Proposal.**

(b) ☐ **Some or all of the text or other material proposed in this Proposal was not authored by me. Its source is as follows:** (please identify which material and provide complete information on its source)

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Signature (Required) John C. Wiles, Jr.

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