



Canadian Standards Association
Mississauga, Ontario
To the Part I Committee

Subject No. 2958

Chair: R.E. Edwards

Date: March 26, 2003

Title: Ampacity of Nickel Conductors, Rule 4-004(15)

Submitted by: Barry O'Connell of Pyrotenax Cables Ltd., 250 West Street, Trenton, Ontario, Tel: (613) 392-6571 Ext: 2221, Fax: (613) 392-1023 on April 6, 2001

Proposal: Addition of a new Subrule to read as follows:

4-004(15) The ampacity of nickel or nickel-clad conductors shall be calculated by the method of the IEEE Standard, Standard Power Cable Ampacity Tables, IEEE 835

Reasons for Request: Nickel and nickel clad conductors in MI cables are used in specific applications where high temperatures exclude the use of copper conductors. There is no table in the Code that references ampacity of nickel and nickel clad conductors at present.

Supporting Information: The calculations based on IEEE 835 or the Naher-McGrath formulae have been proven over time to be reliable and conservative.

Chair's Comments: I am in favour of the proposal. There is a need for this product, in special high temperature applications, and the CSA standard for MI cable recognizes the construction. There are no suitable other mechanisms at present to address this issue within the Code, and the existing ampacity tables are not applicable, and do not lend themselves easily to adaptation to the special needs of nickel conductors.

One consequence of this proposal is that all nickel conductor installations have to be "engineered" for the purpose, but that should not be a significant handicap, since the installation parameters usually require special engineering considerations outside of ampacity requirements, and they are infrequently encountered in actual practice.

Chair's Comments (Second Round)

SUBCOMMITTEE DELIBERATIONS

There were 7 members in favour of the proposal, including two with comments, and 2 against. Both comments from affirmative balloters raised the same point, that the introduction of nickel and nickel-plated conductors was setting a precedent, and code users needed to be alerted to a new feature in the code. Both members provided suggested supplementary wording making reference to the CSA Standard C22.2.No.124. There is some merit in the comments, in my opinion, but there may be a drawback in making reference to a CSA standard in the current code, as some members of Part I are encouraging moving away from identifying Part II standards in the body of the code. In addition possible future recognition of these conductors in other products would require changes due to an out of date reference that would restrict such conductors to Std. 124 products. A proposed addition to the Appendix B notes would meet the same need rather better, and so I propose to add this to the proposal. The two members have agreed with this approach.

One member who disagreed thought that the proposal added too much design to the code, a trend that should be discouraged. He went on to propose an amendment to existing Appendix B notes "...if the electrical inspection department is agreeable....." and the data.... is ".....satisfactory to the department." The main problem is that, without specific recognition within the body of the code, there is no legitimacy for any ampacity, and it is only by having a code reference that this issue becomes resolved. The reference to an amendment to Appendix B notes echoes the comments of the two affirmative balloters. References to the agreeability of the inspection department are redundant, as their agreement is always necessary.

The second negative balloter made several comments:

- These products are used where copper or other kinds of conductors cannot perform
- We should not force engineers and/or manufacturers to use the Neher-McGrath formula
- There is no rule in the code that prohibits these conductors
- Rule 2-024 is enough, and that kind of cables/conductors must be approved for the purpose.

I agree with the first and third comments, but, with reference to his second and fourth points, it is not an issue of whether the code recognizes these conductors, but how the ampacity is arrived at. In fact, this proposed rule points the involved parties in the right direction to obtain that answer. And in response to point 2, without reference to some basis for determining ampacities, we could have anarchy in determining ampacities.

I propose an addition to Appendix B notes to this rule, as follows:-

"Nickel and nickel-plated conductors are now recognized in CSA Standard C22.2.No.124. Ampacity calculations based on the method identified in the rule should use values for electrical conductivity and electrical resistance specified in that standard."

This has the approval of the submitter and the two members with affirmative ballots and proposed rewording.

SUBCOMMITTEE DECISION

Recirculate the proposal to the subcommittee with the amendment for the additional Appendix B note, as worded above.

Subcommittee Deliberation: After the second round of discussion, there were seven members in favour of the proposal (one with comments) and one member opposed. The member opposed did not change his position since the previous round. There is consensus on the proposal, which should proceed to letter ballot.

The comments from the affirmative balloter indicated a preference to make the requirement specific to a particular cable product, made to a specific CSA standard, C22.2 No. 124. Although it is true that this is the only product known to be certified by CSA, this may not always be the case. Possible future recognition of these special conductors in other products would require that we return to this rule in the future, should this happen, even though the precedent has already been set. Also reference to a particular CSA standard in a Part I rule has no precedent. The proposal as amended after the first round of deliberation carries an Appendix B note which effectively provides the same message, and it appears to me that this member's concern has been effectively addressed.

The negative balloter preferred to rely on the generalities of Rule 2-024 as sufficient guidance, but it is questionable as to whether code users would know where to turn to for the ampacities of nickel and nickel-clad conductors, based on this rule. General ampacity rules would seem like the appropriate place in the code to address this.

Subcommittee Recommendation: Send the second round proposal to Part I letter ballot. This now reads as follows:

Rule 4-004(15) as per original proposal.

Appendix B Note to this rule, as follows:

"Nickel and nickel-plated conductors are now recognized in CSA Standard C22.2 No. 124. Ampacity calculations based on the method identified in the rule should use values for electrical conductivity and electrical resistance specified in that standard."