Canadian Standards Association
Mississauga, Ontario
To the Part I Committee

Subject No. 3206 Chair: R.E. Edwards Date: January 24, 2005

Title: Spacings of Conductors, Rules 4-004(9) and (10) and Table 5B

Submitted by: R.E. Edwards of Edwards Tintagel Consulting on October 11, 2004.

Proposals: Amend Rule 4-004 and Table 5B as follows:

(1) Add a new subrule, and number it subrule (9). The new subrule is to read as follows:-

"Where the air spacing between single conductors is maintained at not less than 25% nor more than 100% of the largest cable diameter, the ampacity shall be obtained from subrules 1(a) and 2(a), for copper and aluminum conductors respectively, multiplied by the correction factor obtained from Table 5D."

(2) Renumber existing subrule (9) to subrule (10), and change it to read as follows:-

"Where up to and including 4 single conductors are spaced less than 25% of the larger cable diameter, the ampacity shall be the same as that obtained from subrule (1)(b) or (2)(b), for copper and aluminum conductors, respectively, multiplied by the derating factor obtained from Table 5B."

(3) Change the renumbered subrule (11), existing subrule (10), to read:-

"Single conductor or multiple conductor cables having more than 4 conductors in the run, spaced less than 25% of the largest cable diameter apart, shall have an ampacity obtained from Table 2 or Table 4, for copper and aluminum conductors, respectively, multiplied by the correction factor obtained from Table 5C."

(4) Change the title of Table 5B to read:-

"Table 5B
(See Rule 4-004(10)
Correction Factors For Tables 1 and 3
Where from 2 to 4 Single Conductors Are Spaced Up To 25% Of The Largest Cable Diameter"

(5) Change the reference under the title "Table 5D" to "(See Rules 4-004(9) and 12-2210)".

Reasons for Request: In both cases, whether from Rule 4-004 or Rule 12-2212, single conductor free air ampacities are permitted with one cable diameter spacing, but for other spacings the rules are not aligned. The proposal essentially brings Rules 4-004 and 12-2210 into better alignment. This is justified because similar cable spacings should produce the same ampacities, whether the cables are supported in a cable tray or in any other form of approved raceway in which the air flow occurs in similar manner. The rules in 12-2212 are better worded because they differentiate between cables having maintained spacings between 25-100% of the cable diameter, and those having less than 25% spacing. The proposal captures the essence of Rule 12-2212.

Supporting Information: Comparison with Rule 12-2212.

Subcommittee Deliberations:
There are five members in agreement, two of which had comments, and two members in disagreement.The comments of the two commenters with affirmative votes both noted a wrong reference to Rule 12-2212, which should have been to Rule 12-2210. This is corrected, as appropriate.

The one comment supporting the negative proposed a change to proposed new Sbrule (9) to add the preceding phrase "Except as required by Subrule (10), ……" However, this proposed change would be confusing, since the cases involved are separate and distinct in their wording. That is, proposed Subrule (9) addresses spacings between 25%-100% of the cable diameter, whereas proposed Subrule (10) addresses spacings up to 25% of the cable diameter. Being distinctly separate in their application, an "exception" phrase in the second case is redundant at best, and at worst, confusing.

The second comment is addressed to the wording of proposed Subrule (10), and the commentator would change the subrule to require the derating factor to be applied to ampacities derived from Subrules (1)(a) and 2(a), which effectively means from Tables 1 and 3. A glance at existing Subrule (9), as well as corresponding Subrule 12-2210(3), on which this proposed subrule has been modeled, shows that the correct reference is to Tables 2 and 4, as in the original proposal.

The third comment of the commentator seeks to address proposed Subrule (11) to reintroduce the concept of cables in contact, mixed in with a reference to "less than 25%" cable diameter spacing. The purpose of the original wording was to dispense with the reference to cables in contact, as has been the case in 12-2210(3) for many years, and thus would defeat the purpose of the submitter's proposed rewording of the rule.

A fourth comment from the same member is not happy with the simultaneous addressing of single and multiple conductor cables in the same subrule, yet this is done in 12-2210(3), on which the proposal has been modeled.

The second commentator with a negative position suggested that there are differences between Section 12 and Section 4 ampacity rules based on a better heat dissipation through open trays. However, other means of support than trays would provide equally effective means of heat dissipation. Furthermore, a review of the application of the rules in most jurisdictions indicates that the rules for ampacities are uniformly applied, regardless of whether the cables are in tray, or supported by alternative means. Manufacturers' installation data supports this view.

The second commentator also believed that a "notwithstanding" clause should be required on account of the approval of previous changes to Rule 4-004 at previous meetings. This is not

necessary, for the reasons which are provided in the second paragraph of the subcommittee deliberations.

Subcommittee Recommendation:

There is a consensus in favour of the proposal and it should proceed to Part 1 letter ballot. The comments of the commentators should be circulated to the subcommittee members for their review and response, if required.