



Canadian Standards Association
Etobicoke, Ontario
To the Part I Committee

Subject No. 3046

Chair: R.Leduc

Date: July 30, 2002

Title: Use of Structural Steel, Rule 10-700

Submitted by: George Morlidge of Fluor Canada Ltd., 55 Sunpark Plaza S.E., Calgary, Alberta, T2X 3R4, Tel: (403) 537-4000, Fax: (403) 537-4222 on January 4, 2002.

Proposal: Revise Rule 10-700 as follows:

1. Add a new Paragraph (d) under Subrule (1) of Rule 10-700.
 - (d) The metal frame of a building or structure that provides a permanent and continuous path to earth with impedance sufficiently low to conduct any current liable to be imposed on it to earth without causing a hazardous ground potential rise.
2. Add (see Appendix B) after “10-700 Grounding Electrodes”
3. Add the following Appendix B Note to read as follows:

10-700 A metal frame building or structure to meet the requirements of a ground electrode implies all parts be interconnected with low enough impedance to earth to carry any fault current that may be imposed. This implies a welded structure or structure that is bolted together with bare metal to metal contact of the parts. Sufficiently low impedance with distant earth must be ensured by adequate grounding of the structure to achieve a ground resistance that is low enough to limit ground potential rise to within tolerable limits as defined in Table 52. For ground resistance requirements, see Appendix B Note on Rule 10-500.

Bonding the building to reinforcing steel in concrete footing, steel pilings, etc. can enhance the ground contact of building foundations. Sometimes it may be sufficient to bond one anchor bolt at each column to the reinforcing steel of the concrete footing. Foundations that incorporate waterproofing membranes or make use of coated re-bar or coated steel piles will be less effective in forming ground electrode.

Reasons for Request: This is a very accepted industry practice.

Supporting Information: This is a resubmission (with minor modifications) of Subject 2867 which was narrowly defeated in November of 2000. This is a very accepted industry practice in areas where there is no doubt that the structure is adequately grounded and the rule and associated Appendix Note has been carefully drafted to express this.

The rule is intended to recognize the structure as an extension of the grounding electrode in installations where because of the integrity of the grounding system, adequately low impedance to ground can be maintained when using the structure as an extension of the grounding electrode.

(See also attached letter dated January 24, 2001.)

Chair's Comments: This is virtually identical to the earlier subject 2867 that was narrowly defeated at the November 2000 meeting. The practice of using structural steel as ground is already accepted in Ontario. Attached are two documents:

- Excerpts from the Ontario Electrical code
- A brief slide presentation on the Ontario practice

Ontario has a requirement for having the structure grounded by a grounding conductor at two locations. The Appendix B Note in the proposal suggests that the reinforcing steel in concrete footings, steel piles, etc may provide adequate contact to earth. However the proposals objective wording is quite clear that the impedance must be sufficiently low to carry any current liable to be imposed on it. This proposal is essentially the same as what Ontario is already permitting.

Subcommittee Deliberations (1st Round):

Of 13 Subcommittee members, 9 responded... 8 in favour of the submission and 1 member disagreeing as follows:

I do not support the proposal as I feel there has not been significant supporting information since the last time it was before Part I Committee under Subject 2867.

Besides, it probably isn't needed.

I don't believe that the negative responses in the deliberations on Subject 2867 challenged the use of the rebar on a footing or piling as an electrode, but instead, seemed to focus on the principle of using the metal frame of a building as the "grounding conductor".

I believe that, at present, bare reinforcing steel in a footing or piling can be permitted under 10-702(1) as an "... other similar device." The metal casing of a piling may also be accepted where it can be shown that a coating such as corrosion protection material does not affect its effectiveness.

On the other hand, the path to ground (grounded conductor) and the conductor used to interconnect the various "electrodes" should follow the principles for a grounding conductor outlined in the code, that of a copper conductor of adequate size.

One member offered a minor editorial correction in the Appendix B Note.

Chairs Comments:

Despite the negative from one member of the Subcommittee, I do not find it persuasive enough to go for another round of deliberations and therefore declare consensus for the following:

Subcommittee Recommendation:

1. Add a new Paragraph (d) under Subrule (1) of Rule 10-700

- (d) The metal frame of a building or structures that provides a permanent and continuous path to earth with impedance sufficiently low to conduct any current liable to be imposed on it without causing a hazardous ground potential rise.

2. Add (see Appendix B) after "10-700 Grounding Electrodes"

3. Add the following Appendix B Note to read as follows:

10- 700(d) *A metal frame building or structure to meet the requirements of a ground electrode implies all parts be interconnected with low enough impedance to earth to carry any fault current that may be imposed. This implies a welded structure or structure that is bolted together with bare metal-to-metal contact of the parts. Sufficiently low impedance with distant earth must be ensured by adequate grounding of the structure to achieve a ground resistance that is low enough to limit ground potential rise to within tolerable limits as defined in Table 52. For ground resistance requirements, see Appendix B note on Rule 10-500.*

Bonding the building to reinforcing steel in concrete footings, steel pilings, etc. can enhance the ground contact of building foundations. Sometimes it may be sufficient to bond one anchor bolt at each column to the reinforcing steel of the concrete footing. Foundations that incorporate waterproofing membranes or make use of coated re-bar or coated steel piles will be less effective in forming ground electrode.