



Canadian Standards Association
Mississauga, Ontario
To the Part I Committee

Subject No. 3157

Chair: E. Zebedee

Date: March 22, 2005

Title: Maintenance and Arc Flash, Rule 2-306

Submitted by: Daniel Roberts, Safety Manager, Schneider Electric Canada,
Tel: (905) 678-5384, Fax: 905-678-0145 on December 17, 2003.

Proposal: Amend Rule 2-306 as follows:

Existing rule:

2-306 Maintenance of Live Equipment.

No one shall work on any live equipment unless protected by approved insulated or insulating devices such as tongs, rubber gloves, boots, mats, etc, which shall always be maintained in proper condition for use.

Proposed rule:

2-306 Maintenance of Live Equipment (see Appendix B)

- (1) No one shall work on or near live exposed parts of electrical equipment unless:
 - (a) protected against electrical shock by approved insulated or insulating devices suitable for the voltage level of the live parts; and
 - (b) protected against arc flash by approved personal protective equipment suitable for the conditions under which the work is to be performed.
- (2) The protective equipment required by sub-rule (1) shall always be maintained in proper condition for use.

Appendix B

2-306 NFPA 70E-2000 "Standard for Electrical Safety Requirements for Employee Workplaces" provides assistance in determining severity of potential exposure, planning safe work practices, and selecting personal protective equipment to protect against shock and arc flash hazards.

IEEE 1584 "Guide for Performing Arc Flash Hazard Calculations" provides assistance to determine the arc flash hazard distance and incident energy workers may be exposed to from electrical equipment.

Reasons for Request:

Harmonize with NFPA 70 National Electrical Code Article 110.16 Note 1 "110.16 Flash Protection. FPN No. 1: NFPA 70E-2000, Electrical Safety Requirements for Employee Workplaces, provides assistance in determining severity of potential exposure, planning safe work practices, and selecting personal protective equipment."

While some Provincial Occupational Health and Safety Regulations address this issue, there are currently no provisions which apply nationally requiring persons working on electrical distribution equipment to be protected from arc flash hazards.

Chair's Comments: I agree with this proposal and think that it is only prudent to make the change. As one that has experienced a serious arc flash burn I'm in full support.

Subcommittee Deliberation: As the result of concerns raised by the Subcommittee members, the submitter was asked for more information. Here is his reply:

"Further to Rick Gilmour's request for replies to Part I Subjects, as the submitter of Subject No. 3157, Maintenance and Arc Flash, Rule 2-306, I'm providing additional information to assist you with your decision. Duncan, for one, has asked for more information on the topic.

What is arc flash and arc blast?

According to NFPA there are three general categories of electrical hazards: electrical shock, arc-flash, and arc-blast. (See NFPA 70E Standard for Electrical Safety In the Workplace 2004 Edition, Annex K General Categories of Electrical Hazards). The current rule addresses shock hazards.

Arc Flash - An arc flash occurs when electric current passes through air (arcs) between conductors. An electric arc is one of the hottest things on earth. The temperatures in the arc can reach close to 20,000°C (35,000°F). Exposure to these extreme temperatures both burns the skin directly and causes ignition of clothing, which adds to the burn injury.

Arc-Blast - The tremendous temperatures of the arc cause the explosive expansion of both the surrounding air and the metal in the arc path. For example, copper expands by a factor of 67,000 times when it turns from a solid to a vapor. Concentrated energy radiates outward from the arc in the form of plasma, molten metal and pressure waves.

How frequent or severe are arc flash and blast accidents?

The effects on the human body can range from traumatic severe burns, damaged eyesight, ruptured eardrums, collapsed lungs, to fatal. According to NFPA, the majority of hospital admissions due to electrical accidents are from arc-flash burns, not from shocks. Each year more than 2,000 people in the U.S. are admitted to burn centers with severe arc-flash burns. Arc-flashes can and do kill at distances of 10 ft.

Isn't the submission administrative in nature, does it belong in Part 1?

The stated objective of CE Code, Part 1 is to establish safety standards for the installation and maintenance of electrical equipment. In its preparation, consideration has been given to the prevention of fire and shock hazards, as well as proper maintenance and operation. To achieve this objective a previous Section 2 Subcommittee wisely included the current rule, although administrative in nature. The intent of the submission is to make the current rule comprehensive to address all three electrical hazards.

If adopted, is the new rule enforceable?

I've heard concerns expressed that the new rule may not be enforceable, likely a reference to it being administrative in nature. It will be as enforceable as the current rule. However, I don't believe enforceability is the rule's objective, rather, it raises awareness of the hazard so it will be addressed."

Chair's Comments: I believe the submitter has provided supporting documentation that is acceptable to all members. The negative vote in round one has been resolved.

Subcommittee's Recommendation: To accept the proposal.