

# ESAO Resource

## Information to Assist with the Development of Policies and Procedures for Working on Indoor Energized Electrical Systems Legal Requirements / Legislation Extracts

### Ontario (Canadian) Electrical Safety Code

#### Ontario amendments to the Canadian Electrical Safety Code

**2-000 Scope** - This Code does not apply to:

"(b) Electrical equipment and electrical installations in communication systems from the transformer or other current limiting device used at the junction of the communication system with the electric circuit supplying the communication system;"

(CSA 22.2 No. 950 "Safety Standard for Information Technology Equipment" applies.)

Exception: The code applies to low voltages, including batteries, in hazardous / flammable areas.

#### Defined Voltage Levels

- Extra low voltage      - up to 30 V
- Low voltage              - 31 to 750
- High voltage above      - 750 volts

#### General and Safe Work Rules

The Ontario Electrical Safety Code sets safety standards and guidelines for the installation and maintenance of wiring and electrical equipment. The intent of the code is to prevent electrical fire, electrical failures, and shock hazards by referencing or setting minimum standards for materials used as well as how they are installed and tested.

#### Section 2 - Working safely

This gives very general rules on working safely and using personal protection when operating and maintaining electrical equipment. It provides minimum standards for clearances and some guidance on how to arrange electrical facilities so as to reduce electrical hazards. These are minimal the minimum safety requirements for working with electrical equipment and are intended to be used with other regulations, guidelines, standards and best practices.

#### 2-302 - Hazardous Locations

Prohibits alterations and repairs on energized (live) equipment and equipment in hazardous locations and requires that all electrical equipment in hazardous locations be maintained in its original, safe condition. The rule is not very specific but it does say that; except for approved, intrinsically safe instruments; electrical tools and equipment must meet the standards for use in each hazardous location as well as electrical safety requirements.

#### 2-304 - Energized Electrical Work

Prohibits working on live electrical equipment unless absolutely necessary. This section recognizes that there are times when shutting down power may be impracticable or when inspection and testing of live equipment becomes necessary. This section also requires a lockout procedure, warning signs and "monitors or sentries" to ensure that equipment is not accidentally re-energized while people are working. This section is intended to be used in conjunction with other legislated requirements, such as the Industrial Regulations; standards, such as NFPA 70 (US National Electrical Code) and guidelines, such as lockout procedures, disconnection procedures and working with live equipment.

## **2-306 - Personal Protection**

This sets some basic standards for personal protection when work must be performed with the power on. It states that the following personal protective equipment must be used but gives no specific details. Use tongs, rubber gloves, footwear and rubber mats to isolate workers from electrical shock risks and make the task as safe as possible.

Not included in this list are fire-resistant clothing, face and eye protection, head protection and other precautions also required to protect a worker from harmful effects of an electrical flash or explosion. This section must also be used in conjunction with other standards and guidelines.

## **2-308 - Clearances**

Defines clearances around electrical panels and other equipment requiring electrical servicing as a minimum of one meter with secure footing working space at all locations where access is required for operation or maintenance. This clearance always applies to the front, but may also apply to the sides or backs of equipment where access is necessary. The prescribed minimum distance is in addition to any space necessary for devices such as draw-out circuit-breakers or motor starters when in their fully drawn out positions. The rule also refers to minimum working space around bare live parts.

## **2-310 - Exits Paths**

This requires that when equipment is rated at or above 1200 amperes or above 750 volts, the route to the exit of the room (means of egress) must be clear and at least 1.5 meters wide. The electrical room access doors must also be capable of being opened from inside the room without using a key or tools.

## **2-312 to 2-320 Storage and Misc.**

Require that working space and exits not be blocked by storage, that flammable materials not be stored near electrical equipment and that adequate lighting and drainage be provided.

# **Occupational Health and Safety Act**

## **Industrial Regulations**

41. The entrance to a room or similar enclosure containing exposed live electrical parts shall have a conspicuous sign, warning of the danger, and forbidding entry by unauthorized persons.
42. (1) The power supply to electrical installations, equipment or conductors shall be disconnected, locked out of service and tagged before any work is done, and while it is being done, on or near live exposed parts of the installations, equipment or conductors.
  - (2) Before beginning the work, each worker shall determine if the requirements of subsection (1) have been complied with.
  - (3) Locking out is not required,
    - (a) if the conductors are adequately grounded with a visible grounding mechanism; or
    - (b) if the voltage is less than 300 volts and there is no locking device for the circuit breakers or fuses and procedures are in place adequate to ensure that the circuit is not inadvertently energized.
  - (4) If locking out is not required for the reason set out in clause (3) (b), the employer shall ensure that the procedures required by that clause are carried out.
  - (5) If more than one worker is involved in the work referred to in subsection (1), the worker who disconnected and locked out the power supply shall communicate the purpose and status of the disconnecting and locking out.
  - (6) If a tag is used as a means of communication, the tag,
    - (a) shall be made of non-conducting material;
    - (b) shall be secured to prevent its inadvertent removal;
    - (c) shall be placed in a conspicuous location;
    - (d) shall state the reason the switch is disconnected and locked out;
    - (e) shall show the name of the worker who disconnected and locked out the switch; and
    - (f) shall show the date on which the switch was disconnected and locked out.
  - (7) ***The employer shall establish and implement written procedures for compliance with this section.***

- 42.1 (1) This section applies and section 42 does not apply if it is not practical to disconnect electrical installations, equipment or conductors from the power supply before working on, or near, live exposed parts of the installations, equipment or conductors.**
- (2) The worker shall use rubber gloves, mats, shields and other protective equipment and procedures adequate to ensure protection from electrical shock and burns while performing the work.
- (3) If the installation, equipment or conductor is operating at a nominal voltage of 300 volts or more, a suitably equipped competent person who is able to recognize the hazards and perform rescue operations, including artificial respiration, shall be available and able to see the worker who is performing the work.
- (4) Subsection (3) does not apply to equipment testing and trouble-shooting operations.
- 42.2** Work performed on electrical transmission systems or outdoor distribution systems rated at more than 750 volts shall be performed in accordance with,
- (a) the *Rule Book, Electric Utility Operations* published in 1990 by the Electrical Utilities Association of Ontario, Incorporated; or
- (b) the *Ontario Hydro Corporate Safety Rules and Policies*, dated 1994.
- 43.** Tools and other equipment that are capable of conducting electricity and endangering the safety of any worker shall not be used in such proximity to any live electrical installation or equipment that they might make electrical contact with the live conductor
- 44.** (1) Cord-connected electrical equipment and tools shall have a casing that is adequately grounded.
- (2) Subsection (1) does not apply to cord-connected electrical equipment or tools that are adequately double-insulated and whose insulated casing shows no evidence of cracks or defects.
- (3) Subsection (1) does not apply to a portable electrical generator in which the equipment is not exposed to an external electric power source if the casings of portable electrical tools connected to the generator are bonded to a non-current-carrying part of the generator.
- 44.1** When used outdoors or in wet locations, portable electrical tools shall be protected by a ground fault circuit interrupter installed at the receptacle or on the circuit at the panel.
- 44.2** A ground fault that may pose a hazard shall be investigated and removed without delay.

## **CSA International (Canadian Standards Association)**

### **CSA 22.2 No. 950/UL 1950**

#### **Safety Standard for Information Technology Equipment, IEC 60950**

##### **Hazardous Energy Level**

A stored energy level of 20J or more, or an available continuous power level of 240 VA or more, at a potential of 2V or more.

##### **Hazardous Voltage**

A voltage exceeding 42.4V peak or 60V d.c., existing in a circuit which does not meet the requirements for either a Limited Current Circuit or a TNV Circuit.

## **US Legislated Standards Referenced**

### **Definition of hazardous voltage in the National Electric Code (NEC):**

A hazardous voltage is a voltage greater than 50 V. (Article 720) [SEMI S2-93]

### **NFPA 70E and OSHA**

US standards referred to in Canadian legislation. The US and Canada are in the process of harmonizing regulations and standards and these US standards will probably apply in Canada. These standards currently set the requirements for electrical hazard classes, personal protective equipment and best practices.