1 PURPOSE

1.1 To define best practices for work involving electrical distribution systems and electrical equipment and tools.

1.2 To ensure compliance with the Occupational Health and Safety Act and the Canadian Electrical Code.

2 SCOPE

2.1 All individuals (staff and students) who are required to work on or near electrical distribution systems and / or with electrical equipment and tools.

2.2 All contractors and subcontractors who are required to work on or near electrical distribution systems and / or electrical equipment and tools.

3 RELATED DOCUMENTS

3.1 Occupational Health and Safety Act and O. Reg. 851 Industrial Establishments, Sections 40, 43, 44 (See Appendix A).

3.2 Occupational Health and Safety Act and O. Reg. 851 General Construction, Sections 181-195.

3.3 Ontario Electrical Safety Code O. Reg. 169/99.

3.4 NFPA 70E Standard for Electrical Safety in tbe Workplace (2009).

3.5 CSA Standard CAN C22.2 No. 745-1-04 Safety of Portable Electric Tools Part 1.

3.6 CSA Standard CAN C22.2 No. 745-2-04 Series, Safety of Portable Electric Tools Part 2.

3.7 CSA Standard CAN C22.2 No. 144- 2001, Ground Fault Circuit Interrupters.

3.8 McMaster University RRM # 100 Workplace & Environmental Health and Safety Program

3.9 McMaster University RMM # 111 Contracting Work Safely Program/Due Diligence Program

3.10 McMaster University RMM # 300 Safety Orientation and Training Program.

3.11 McMaster University RMM # 301 Standard Operating Procedures (SOP's) Program.

3.12 McMaster University RMM # 306 Lockout / Tagout Program.

3.13 McMaster University RMM # 304 Working Alone Program.

3.14 McMaster University RMM #325 Process and Equipment Purchase and/or Modifications

3.15 McMaster University RMM # 317 Machine Shop Safety Program

4 DEFINITIONS

4.1 **Authorized Person** – someone who has permission from the University to perform electrical work

4.2 **Competent Worker** – qualified electrician or an apprentice who worked directly under the supervision of a qualified electrician or a person with equivalent qualifications by training/experience

4.3 **Construction Project Safety Management Plan** – a written plan that shall describe compliance strategies for all applicable health and safety legislation, foreseeable job site hazards and precautionary measures, prerequisite employee safety training, safe work procedures, standard operating procedures (SOP's), first aid preparedness, stop work procedures, emergency response plans, incident reporting procedures, and the names and contact numbers of the job–site safety supervisor (s).

4.4 **Employe**r- A person who employs one or more workers or contracts for the services of one or more workers and includes a contractor or subcontractor who performs work or supplies services and a contractor or subcontractor who undertakes with the owner, constructor, contractor or subcontractor, to perform work or supply services.

4.5 **Electrical Distribution Services** – equipment for the generation and distribution of electricity.

4.6 **Electrical Equipment** – equipment that uses electricity.

4.7 **Electrical Shock** – the effect produced on the body and in particular the nerves, by an electrical current passing through it. The magnitude of the shock depends on current flow, usually measured in milliamperes (mA) rather than by voltage (measured in volts). It is possible to have contact with extremely high voltages with little current and have no injury occur in the voltage discharge.

4.8 **Ensure –** take every reasonable precaution to achieve the stated objective.

4.9 **Shall—**a legal term meaning must.

4.10 **High Voltage** – a voltage of seven hundred volts or more between any two conductors and ground.

4.11 **Locked Out—**in respect of any electrical equipment, that the equipment has been de-energized and rendered inoperative and cannot be operated or be energized without the consent of the person who rendered it inoperative.

4.12 **Tagout –** a general term for all methods of ensuring the protection of personnel from uncontrolled energy sources by installing tags on energy isolating devices.

4.13 **Qualified Electrician** – a person who because of knowledge, training and experience, is licensed and otherwise qualified to perform work safely and properly.

4.14 **Safety Watcher** – a person who is authorized to stop work immediately in the event of danger, and who is trained in emergency procedures including first aid and CPR.

4.15 **Standard Operating Procedures** – Written procedures required by the OHSA under specific regulations and by McMaster University Programs that define the techniques, processes and best practices required to prevent injury and/ or occupational illness or damage to University equipment or the environment.

4.16 **Supervisor –** Person who has charge of a workplace or authority over a worker.

4.17 **Technical Specialist (Electrical)** – Person responsible for the provision of support and direction regarding the maintenance and installation of electrical services and equipment on campus (See Section 5.4).

4.18 **Worker –** a person who performs work or supplies services for monetary compensation.

4.19 **Constructor** – a person who undertakes a project for an owner and includes an owner who undertakes all or part of a project by himself / herself or by more than one employer; also called the general or prime contractor. The constructor has complete control of the work on behalf of the construction project owner, and has responsibility for regulatory compliance and safe work procedures on the job site.

4.20 **Acronyms**

CSA – Canadian Standards Association

CJHSC – Central Joint Health and Safety Committee

CPR - Cardio-Pulmonary Resuscitation

EOHSS – Environmental and Occupational Health Support Services

ESA – Electrical Safety Authority

FHSc Safety Office– Faculty of Health Science Safety Office

GFCI – Ground Fault Circuit Interrupter; protects against electrical leakage shocks.

JHSC – Joint Health and Safety Committee

LOTO – Lockout /Tagout

MOL – Ministry of Labour

OHSA - Occupational Health and Safety Act

RMSG – Risk Management Support Group

RMM – Risk Management Manual

SOP – Standard Operating Procedure

5 RESPONSIBILITIES

5.1 **Role of Senior Managers (Directors / Deans / Chairs / Department Managers):**

Senior Managers shall:

- provide the resources and direction necessary to support and maintain an effective Electrical Safety Program; and
- ensure all electrical work within their area of responsibility is carried out in compliance with McMaster University's Health and Safety Policy and Programs.

5.2 **Role of Facility Services:**

Facility Services shall:

- ensure that the design, construction, installation and inspection of electrical distribution services meet the standards of the Ontario Electrical Safety Code;
- ensure the operation and maintenance of electrical distribution services meet the standards of the Ontario Electrical Safety Code;
- ensure that plans and specifications for new electrical facilities and major alterations are submitted to the appropriate municipal and / or provincial agencies for review and approval;
- ensure that only contractors approved as prescribed under McMaster University RMM # 111 Contracting Work Safety – Due Diligence Program are authorized to service and / or install electrical distribution services and equipment;
- ensure that only qualified electricians or an apprentice who works under the direct supervision of a qualified electrician or a person with equivalent qualifications by training and experience shall connect maintain or modify electrical equipment or installations (See O. Reg. 213 / 91 Appendix A);
- ensure that energized parts of electrical circuits and service equipment are guarded by approved cabinets or enclosures;
- ensure that electrical disconnect switches and circuit breakers are labeled and that access to such switches and control devices is unobstructed (1 m clearance);
- ensue that ground fault circuit interrupters (GFCI's) are installed on temporary circuits at renovation and construction sites;
- ensure that all new electrical installations are inspected by the ESA; and
- ensure utilities services are contacted for underground locates (See Appendix B).

5.3 **Role of Constructor / Contractor (NB: This includes University departments that assume the role of a constructor while acting as an owner or employer) when installing and or servicing electrical systems and equipment:**

Constructor and Contractors shall:

- as part of their contract agree to comply with all applicable health and safety legislation (e.g. O. Reg. 213/91 Regulations for Construction Projects), environmental protection legislation, Municipal Bylaws, industry standards;
- as part of the tendering process complete and submit the **McMaster University Contractors Health and Safety Questionnaire**, if not on file (pre-qualified contractors shall update and resubmit this questionnaire every three years);
- as part of the tendering process submit a **Construction Project Safety Management Plan** that is designed to address all of the risk associate with the project (See definition in Section 1 of this Program);
- ensure that the design, construction, installation and inspection of electrical distribution services meet the standards of the Ontario Electrical Safety Code;

- comply with all relevant McMaster University programs as defined in the McMaster University Risk Management Manual and all relevant McMaster University Building and Design Standards;
- ensure that only qualified electricians or an apprentice who works under the direct supervision of a qualified electrician or a person with equivalent qualifications by training and experience shall connect maintain or modify electrical equipment or installations (See O. Reg. 213 / 91 Appendix A);
- ensure that ground fault circuit interrupters (GFCI's) are installed on temporary circuits at renovation and construction sites;
- provide ESA inspection certificates for all electrical installations; and
- obtain a Utility Services Underground Services Locate Permit from Facility Services prior to any excavation on McMaster University property (See Appendix B: Utilities Services Procedures SOP # 22-1).

5.4 **Role of Facility Services Technical Specialist (Electrical):**

The Facility Services Technical Specialist (Electrical) shall:

- provide direction and support to Supervisors and Contractors regarding the development of SOP's for work on electrical systems and/or equipment;
- provide direction and support to ensure compliance with the McMaster University RMM # 306 Lockout / Tagout Program for work on the electrical systems and related equipment;
- review and make comment on projects involving the maintenance and/or installation of electrical services and equipment on campus;
- provide SOP's as required for work related to the servicing and replacement of all components of the electrical distribution system on campus;
- develop technical service standards for work on electrical systems and equipment;
- in conjunction with the Service Manager determine technical training needs for all staff authorized to work on electrical systems and equipment;
- provide for twenty four hour response to emergencies involving the electrical distribution system on campus; and
- coordinate services provided by hydro providers, independent electrical service providers and Facility Services electrician for work on high voltage systems.

5.5 **Role of Supervisors:**

Supervisors shall:

- be qualified to supervise work involving the installation, modification, adjustment, testing or repair of electrical distribution systems;
- ensure that only qualified electricians or an apprentice who works under the direct supervision of a qualified electrician shall install, modify, adjust, test or repair electrical distribution systems;

- consult with the Technical Specialist (Electrical) as necessary on work involving electrical systems and/or electrical equipment;
- ensure that electrical equipment that is capable of becoming live is de-energized, locked out, tagged and tested before work is performed on the equipment (See McMaster University RMM # 306 Lockout / Tagout Program);
- ensure that all electrical testing equipment is readily available and maintained in good working order;
- ensure that when equipment cannot be locked out, a written SOP including, tagout, testing and competent worker standby is developed to provide an equivalent level of safety to that provided by a lockout procedure;
- take measures to protect workers from injury when work must be performed near live electrical equipment;
- appoint safety watchers when work must be done near live electrical equipment;
- ensure that electrical tools and equipment used in damp or outdoor environments are protected by ground fault interrupters (GFCI's) ;
- ensure utilities services are contacted for underground locates (See Appendix B).
- ensure that electrical equipment is maintained in safe working order; and
- ensure that all electrical equipment and appliances have CSA, ESA or equivalent inspection agency approval **prior to installation** and/or use RMM#325 Process and Equipment Purchase and/or Modifications.

5.6 **Role of Authorized Individuals:**

Persons authorized to undertake work involving the installation, modification, adjustment, testing or repair of electrical distribution systems and equipment shall:

- be qualified and certified to undertake work involving the installation, modification, adjustment, testing or repair of electrical distribution systems;
- observe all safety rules and best practices related to work involving the installation, modification, adjustment, testing or repair of electrical distribution systems;
- work in compliance with all SOP's for work involving the installation, modification, adjustment, testing or repair of electrical distribution systems;
- ensure that electrical equipment that is capable of becoming live is locked out, tagged and tested before work is performed on the equipment (See McMaster University RMM # 306 Lockout / Tagout Program);
- follow the written procedures outlined in SOP's for work on electrical equipment that cannot be locked out, including tagout, testing and safety watcher standby;
- wear protective equipment and clothing as prescribed for work involving the installation, modification, adjustment, testing or repair of electrical distribution systems;
- report all unsafe electrical conditions and / or equipment; and

- report to the supervisor all injuries and incidents having the potential to injure or damage equipment.

5.7 **Role of Environmental and Occupational Health Services (EOHSS) and Faculty of Health Sciences Safety Office (FHSc Safety Office):**

The EOHSS and/or FHSc Safety Office shall:

- update the Electrical Safety Program as required by new legislation and/or best practices;
- provide advice regarding the development of SOP's for work involving the installation, modification, adjustment, testing or repair of electrical distribution systems; and
- conduct periodic audits of the effectiveness of Electrical Safety Program.

5.8 **Role of the Joint Health and Safety Committee**

The JHSC shall:

- review SOP's related to work involving the installation, modification, adjustment, testing or repair of electrical distribution systems upon request;
- assess the effectiveness of the Program as part of the safety inspection process.

5.9 **Role of the Central Joint Health and Safety Committee:**

The CJHSC shall:

- review and make comment on the Electrical Safety Program on scheduled basis.

6 PROCEDURES

6.1 **Work Procedures**

6.1.1 The safety regulations and electrical equipment standards for insulating materials and conductors as outlined under **O. Reg. 851, RRO 1990 Industrial Establishments, Sections 40, 41, 42, 43, 44, and O. Reg. 213 / 91 Construction Projects, Sections 181–195 as outlined in Appendix A.** shall be deemed to be minimum standards of protection for work involving such equipment and materials.

6.1.2 Operation and maintenance of electrical distribution systems and equipment shall meet the standards of the Canadian Electrical Safety Code.

6.1.3 All electrical distribution services and equipment must be designed, installed and inspected in accordance with the Ontario Electrical Safety Code.

6.1.4 All electrical equipment, materials, tools and appliances must be CSA or Canadian equivalent approved.

6.1.5 Arrangements shall be made through the Facility Services Technical Specialist (Electrical) for inspection and approval of electrical equipment by hydro provider or an ESA safety inspector.

6.1.6 Prior to any excavation on McMaster University property a permit must be obtained from Facility Services (See Appendix B: Utilities Services Procedures SOP # 22-1).

6.1.7 Electrical equipment that is capable of becoming live shall be isolated, locked out, tagged and tested before work is performed on the equipment. (See RMM # 306 Lockout / Tagout Program).

6.1.8 When equipment cannot be locked out, a written SOP (including tagout, testing, safety watcher standby and emergency procedures shall be developed and implemented to provide an equivalent level of safety to that provided by a lockout procedure (See RMM # 301 Standard Operating Procedures (SOP's) Program).

6.1.9 An SOP must be provided for all work performed near live electrical equipment (See RMM # 301 Standard Operating Procedures (SOP's) Program)

6.1.10 Working alone is prohibited on energized lines or equipment that exceeds 300 volts (See RMM # 304 Working Alone Program).

6.1.11 Safety watchers must be provided for all work performed near live electrical equipment.

6.1.12 Electrical disconnect switches and circuit breakers shall be labeled. Access to electrical switches, control devices and meters shall be unobstructed.

6.1.13 GFCIs shall be used to provide electrical safety outdoors or in damp environments. In addition to protecting against leakage problems with extension cords and power tools GFCs protect against ground faults caused by improper wiring when electrical plugs are replaced

6.2 **Certification and Training**

6.2.1 No worker shall install, modify, adjust, test, or repair electrical distribution services unless the worker is a qualified electrician or an apprentice working under the direct supervision of a qualified electrician.

6.2.2 All workers required to work on or near electrical systems and or equipment must be trained and certified in Lockout / Tagout procedures ((See RMM # 306 Lockout / Tagout Program).

6.2.3 Individuals required to work regularly around energized electrical equipment or distribution systems shall be trained and qualified in cardio-pulmonary resuscitation (CPR).

7 RECORDS

7.1 To facilitate internal audits and audits by regulatory agencies e.g. Ministry of Labour, copies of all SOP's must be retained by supervisor for a minimum of three years for work involving lockout and or work on live electrical systems or equipment

Appendix A

Requirements of the Occupational Health and Safety Act

O. Reg. 851, RRO 1990 Industrial Establishments, Sections 40, 41, 42, 43, 44

40. Electrical equipment, insulating materials and conductors shall be,

(a) suitable for its use; and

(b) certified by,

(i) the Canadian Standards Association, or

(ii) the Electrical Safety Authority, as defined in the *Electricity Act, 1998*. R.R.O. 1990, Reg. 851, s. 40; O. Reg. 144/99, s. 2.

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. R.R.O. 1990, Reg. 851, s. 41.

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. O. Reg. 630/94, s. 1.

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. O. Reg. 630/94, s. 1.

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. O. Reg. 630/94, s. 1; O. Reg. 144/99, s. 3.

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. R.R.O. 1990, Reg. 851, s. 43.

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. O. Reg. 630/94, s. 2.

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. O. Reg. 630/94, s. 2.

44.2 A ground fault that may pose a hazard shall be investigated and removed without delay. O. Reg. 630/94, s. 2.

O. Reg. 213 / 91 Construction Projects, Sections 181– 195

181. (1) Except where otherwise required by this Regulation, electrical work performed on or near electrical transmission or distribution systems shall be performed in accordance with the document entitled “Electrical Utility Safety Rules” published by the Electrical and Utilities Safety Association of Ontario Incorporated and revised January, 2009. O. Reg. 627/05, s. 4.

(2) Sections 182, 187, 188, 189, 190, 191 and 193 do not apply to electrical work that is performed on or near electrical transmission or distribution systems if the work is performed in accordance with the document referred to in subsection (1). O. Reg. 627/05, s. 4.

182. (1) No worker shall connect, maintain or modify electrical equipment or installations unless,

(a) the worker is an electrician certified under the *Trades Qualification and Apprenticeship Act*; or

(b) the worker is otherwise permitted to connect, maintain or modify electrical equipment or installations under the *Trades Qualification and Apprenticeship Act*, the *Apprenticeship and Certification Act, 1998* or the *Technical Standards and Safety Act, 2000*. O. Reg. 627/05, s. 4.

(2) A worker who does not meet the requirements of clause (1) (a) or (b) may insert an attachment plug cap on the cord of electrical equipment or an electrical tool into, or remove it from, a convenience receptacle. O. Reg. 627/05, s. 4.

183. Every reasonable precaution shall be taken to prevent hazards to workers from energized electrical equipment, installations and conductors. O. Reg. 627/05, s. 6.

184. (1) No person, other than a person authorized to do so by the supervisor in charge of the project, shall enter or be permitted to enter a room or other enclosure containing exposed energized electrical parts. O. Reg. 627/05, s. 7.

(2) The entrance to a room or other enclosure containing exposed energized electrical parts shall be marked by conspicuous warning signs stating that entry by unauthorized persons is prohibited. O. Reg. 627/05, s. 7.

185. (1) Electrical equipment, installations, conductors and insulating materials shall be suitable for their intended use and shall be installed, maintained, modified and operated so as not to pose a hazard to a worker. O. Reg. 627/05, s. 7.

(2) For greater certainty, the regulations made under section 113 of the *Electricity Act, 1998* apply to electrical equipment, installations, conductors and insulating materials and to temporary wiring installations on projects. O. Reg. 627/05, s. 7.

186. Electrical equipment, installations and conductors that are not to be used for the purpose for which they were designed shall be,

(a) removed; or

(b) left in an electrically non-hazardous condition by being disconnected, de-energized, tagged and,

(i) grounded, in the case of power lines,

(ii) locked out, in the case of electrical equipment. O. Reg. 627/05, s. 7.

187. Tools, ladders, scaffolding and other equipment or materials capable of conducting electricity shall not be stored or used so close to energized electrical equipment, installations or conductors that they can make electrical contact. O. Reg. 627/05, s. 7.

188. (1) This section applies unless the conditions set out in clauses 189 (a) and (b) are satisfied. O. Reg. 627/05, s. 7.

(2) No object shall be brought closer to an energized overhead electrical conductor with a nominal phase-to-phase voltage rating set out in Column 1 of the Table to this subsection than the distance specified opposite to it in Column 2.

TABLE

Column 1	Column 2
Nominal phase-to-phase voltage rating	Minimum distance
750 or more volts, but no more than 150,000 volts	3 metres
more than 150,000 volts, but no more than 250,000 volts	4.5 metres
more than 250,000 volts	6 metres

O. Reg. 627/05, s. 7.

(3) Subsections (4) to (9) apply if a crane, similar hoisting device, backhoe, power shovel or other vehicle or equipment is operated near an energized overhead electrical conductor and it is possible for a part of the vehicle or equipment or its load to encroach on the minimum distance permitted under subsection (2). O. Reg. 627/05, s. 7.

(4) A constructor shall,

(a) establish and implement written measures and procedures adequate to ensure that no part of a vehicle or equipment or its load encroaches on the minimum distance permitted by subsection (2); and

(b) make a copy of the written measures and procedures available to every employer on the project. O. Reg. 627/05, s. 7.

(5) The written measures and procedures shall include taking the following precautions to protect workers:

1. Adequate warning devices, visible to the operator and warning of the electrical hazard, shall be positioned in the vicinity of the hazard.

2. The operator shall be provided with written notification of the electrical hazard before beginning the work.

3. A legible sign, visible to the operator and warning of the potential electrical hazard, shall be posted at the operator's station. O. Reg. 627/05, s. 7.

(6) Before a worker begins work that includes an activity described in subsection (3), the employer shall provide a copy of the written measures and procedures to the worker and explain them to him or her. O. Reg. 627/05, s. 7.

(7) The worker shall follow the written measures and procedures. O. Reg. 627/05, s. 7.

(8) A competent worker, designated as a signaller, shall be stationed so that he or she is in full view of the operator and has a clear view of the electrical conductor and of the vehicle or equipment, and shall warn the operator each time any part of the vehicle or equipment or its load may approach the minimum distance. O. Reg. 627/05, s. 7.

(9) Section 106 also applies with respect to the signaller designated under subsection (8). O. Reg. 627/05, s. 7.

189. Section 188 does not apply if,

(a) under the authority of the owner of the electrical conductor, protective devices and equipment are installed, and written measures and procedures are established and implemented, that are adequate to protect workers from electrical shock and burn; and

(b) the workers involved in the work use protective devices and equipment, including personal protective equipment, and follow written measures and procedures that are adequate to protect workers from electrical shock and burn. O. Reg. 627/05, s. 7.

190. (1) This section applies if work is to be done on or near energized exposed parts of electrical equipment or of an electrical installation or conductor. O. Reg. 627/05, s. 7.

(2) An employer shall,

(a) establish and implement written measures and procedures for complying with this section to ensure that workers are adequately protected from electrical shock and burn; and

(b) make a copy of the written measures and procedures available to every worker on the project. O. Reg. 627/05, s. 7.

(3) The worker shall follow the written measures and procedures. O. Reg. 627/05, s. 7.

(4) Subject to subsection (9), the power supply to the electrical equipment, installation or conductor shall be disconnected, locked out of service and tagged in accordance with subsection (6) before the work begins, and kept disconnected, locked out of service and tagged while the work continues. O. Reg. 627/05, s. 7.

(5) Hazardous stored electrical energy shall be adequately discharged or contained before the work begins and shall be kept discharged or contained while the work continues. O. Reg. 627/05, s. 7.

(6) The following rules apply to the tagging of the power supply under subsection (4):

1. The tag shall be made of non-conducting material and shall be installed so as not to become energized.

2. The tag shall be placed in a conspicuous location and shall be secured to prevent its inadvertent removal.

3. The tag shall indicate,

i. why the equipment, installation or conductor is disconnected,

ii. the name of the person who disconnected the equipment, installation or conductor,

iii. the name of the person's employer, and

iv. the date on which the equipment, installation or conductor was disconnected.

4. The tag shall not be removed unless it is safe to do so. O. Reg. 627/05, s. 7.

(7) A worker, before beginning work to which this section applies, shall verify that subsections (4) and (5) have been complied with. O. Reg. 627/05, s. 7.

(8) If more than one worker is involved in work to which this section applies, a means shall be provided to communicate the purpose and status of,

(a) the disconnecting, locking out and tagging of the electrical equipment, installation or conductor; and

(b) the discharging and containment of any hazardous stored electrical energy. O. Reg. 627/05, s. 7.

(9) Locking out is not required under subsection (4) if,

(a) in the case of a conductor, it is adequately grounded with a visible grounding mechanism;

(b) in the case of equipment or an installation,

(i) the power supply is less than 300 volts, the equipment or installation was not manufactured with provision for a locking device for the circuit breakers or fuses, and a written procedure has been implemented that is adequate to ensure that the circuit is not inadvertently energized, or

(ii) the power supply is 300 or more volts but not more than 600 volts, the equipment or installation was not manufactured with provision for a locking device for the circuit breakers or fuses, a written procedure as to how work is to be done has been implemented and the work is supervised by a competent worker to ensure that the circuit is not inadvertently energized. O. Reg. 627/05, s. 7.

191. (1) This section applies instead of section 190 if work is to be done on or near energized exposed parts of electrical equipment or of an electrical installation or conductor and,

(a) it is not reasonably possible to disconnect the equipment, installation or conductor from the power supply before working on or near the energized exposed parts;

(b) the equipment, installation or conductor is rated at a nominal voltage of 600 volts or less, and disconnecting the equipment, installation or conductor would create a greater hazard to a worker than proceeding without disconnecting it; or

(c) the work consists only of diagnostic testing of the equipment, installation or conductor. O. Reg. 627/05, s. 7.

(2) Subsection (10) applies, in addition to subsections (3) to (9), if the equipment, installation or conductor is nominally rated at,

(a) greater than 400 amperes and greater than 200 volts; or

(b) greater than 200 amperes and greater than 300 volts. O. Reg. 627/05, s. 7.

(3) Only a worker who meets the requirements of clause 182 (1) (a) or (b) shall perform the work. O. Reg. 627/05, s. 7.

(4) The constructor shall,

(a) ensure that written measures and procedures for complying with this section are established and implemented, so that workers are adequately protected from electrical shock and burn; and

(b) make a copy of the written measures and procedures available to every employer on the project. O. Reg. 627/05, s. 7.

(5) Before a worker begins work to which this section applies, the employer shall provide a copy of the written measures and procedures to the worker and explain them to him or her. O. Reg. 627/05, s. 7.

(6) The worker shall follow the written procedures. O. Reg. 627/05, s. 7.

(7) A worker shall use mats, shields or other protective devices or equipment, including personal protective equipment, adequate to protect the worker from electrical shock and burn. O. Reg. 627/05, s. 7.

(8) If the electrical equipment, installation or conductor is rated at a nominal voltage of 300 volts or more, an adequately equipped competent worker who can perform rescue operations, including cardiopulmonary resuscitation, shall be stationed so that he or she can see the worker who is performing the work. O. Reg. 627/05, s. 7.

(9) Subsection (8) does not apply if the work consists only of diagnostic testing of the equipment, installation or conductors. O. Reg. 627/05, s. 7.

(10) In the case of equipment or of an installation or conductor described in subsection (2), a worker shall not perform the work unless the following additional conditions are satisfied:

1. The owner of the equipment, installation or conductor has provided the employer and the constructor with a record showing that it has been maintained according to the manufacturer's specifications.

2. A copy of the maintenance record is readily available at the project.

3. The employer has determined from the maintenance record that the work on the equipment, installation or conductor can be performed safely without disconnecting it.

4. Before beginning the work, the worker has verified that paragraphs 1, 2 and 3 have been complied with. O. Reg. 627/05, s. 7.

192. All tools, devices and equipment, including personal protective equipment, that are used for working on or near energized exposed parts of electrical equipment, installations or conductors shall be designed, tested, maintained and used so as to provide adequate protection to workers. O. Reg. 627/05, s. 7.

193. (1) A worker who may be exposed to the hazard of electrical shock or burn while performing work shall use rubber gloves,

(a) that are adequate to protect him or her against electrical shock and burn;

(b) that have been tested and certified in accordance with subsection (2), if applicable; and

(c) that have been air tested and visually inspected for damage and adequacy immediately before each use. O. Reg. 627/05, s. 7.

(2) Rubber gloves rated for use with voltages above 5,000 volts AC shall be tested and certified to ensure that they can withstand the voltages for which they are rated,

(a) at least once every three months, if they are in service;

(b) at least once every six months, if they are not in service. O. Reg. 627/05, s. 7.

(3) Rubber gloves shall be worn with adequate leather protectors and shall not be worn inside out. O. Reg. 627/05, s. 7.

(4) Leather protectors shall be visually inspected for damage and adequacy immediately before each use. O. Reg. 627/05, s. 7.

(5) Rubber gloves or leather protectors that are damaged or not adequate to protect workers from electrical shock and burn shall not be used. O. Reg. 627/05, s. 7.

(6) Workers shall be trained in the proper use, care and storage of rubber gloves and leather protectors. O. Reg. 627/05, s. 7.

194. (1) A switch and panel board controlling a service entrance, service feeder or branch circuit shall meet the requirements of this section. O. Reg. 627/05, s. 7.

(2) A switch and panel board shall be securely mounted on a soundly constructed vertical surface and shall have a cover over uninsulated parts carrying current. O. Reg. 627/05, s. 7.

(3) A switch and panel board shall be located,

(a) in an area where water will not accumulate; and

(b) within easy reach of workers and readily accessible to them. O. Reg. 627/05, s. 7.

(4) The area in front of a panel board shall be kept clear of obstructions. O. Reg. 627/05, s. 7.

(5) A switch that controls a service entrance, service feeder or branch circuit providing temporary power,

(a) shall not be locked in the energized position; and

(b) shall be housed in an enclosure that can be locked and is provided with a locking device. O. Reg. 627/05, s. 7.

195. All electrical extension cords used at a project shall have a grounding conductor and at least two other conductors. O. Reg. 627/05, s. 7.

195.1 (1) Cord-connected electrical equipment or tools shall have a casing that is adequately grounded. O. Reg. 627/05, s. 7.

(2) All cord connections to electrical equipment or tools shall be polarized. O. Reg. 627/05, s. 7.

(3) Subsections (1) and (2) do 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. O. Reg. 627/05, s. 7.

(4) Subsection (1) does not apply to a portable electrical generator in which the electrical equipment or tools are not exposed to an external electric power source if the casing of portable electrical equipment or tools connected to the generator is bonded to a non-current-carrying part of the generator. O. Reg. 627/05, s. 7.

195.2 When a portable electrical tool is used outdoors or in a wet location,

(a) if the source of power is an ungrounded portable generator having a maximum output of 1.8 kilowatts or less, a ground fault circuit interrupter of the Class A type shall be located in the cord feeding the tool, as close to the tool as possible;

(b) in all other cases, the tool shall be plugged into a receptacle protected by a ground fault circuit interrupter of the Class A type. O. Reg. 627/05, s. 7.

195.3 (1) Defective electrical equipment and tools that may pose a hazard shall be immediately disconnected, removed from service and tagged as being defective. O. Reg. 627/05, s. 7.

(2) The cause of a ground fault or the tripping of a ground fault circuit interrupter shall be immediately investigated to determine the hazard and corrective action shall be taken immediately. O. Reg. 627/05, s. 7.

Appendix B. Facility Services: Locates For Underground Services

Utilities Services Procedures

Procedure # 116-2

Re: Utilities Services Procedure # 116-2 – Locates for Underground Services

Locates for Underground Services

1. All requests for locates are to be made to Utilities Services
   - 905 -525-9140 x 24426, Patrick Burke or Doug Dick
2. Utilities Services will arrange to meet with the requestor and the locate company at the site
3. The requestor will identify the work area, the locater will mark off all located services with paint.
4. Utilities services will keep the original copy of the locate on file and issue a photocopy of the locate to the requestor.