

**April 18, 2018**

**ELECTRICAL SAFETY**

**PURPOSE/APPLICATION**

The purpose of this practice is to provide guidance and communicate expectations as it pertains to electrical safety and the Canadian Electric Code.

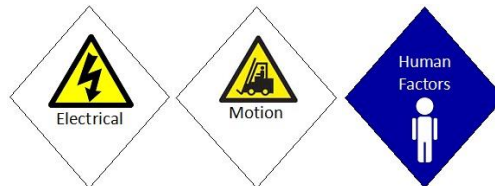
**PPE**

- CPES minimum requirements
- Additional PPE as determined by the hazard assessment.

**TRAINING**

**HAZARDS & CONCERNS**

- Personal Injury
- Motion
- Electrical (overhead /buried /energized systems)
- Energized Systems (Lock Out / Tag Out)



**PRECAUTIONS**

***Policy:***

All electrical employees shall be provided basic electrical safety training. Employees should be provided training on working safely with electricity, recognition of electrical hazards, prevention of electrical shock and arc flash, and recognition of electrical shock and arc flash hazard labels.

1. CPES shall only permit competent, qualified electrical workers to work at CPES worksites. Only qualified electricians may enter electrical rooms and enclosures containing live parts.
2. The design, construction, installation, and inspection of electrical distribution services shall meet the standards of the *Canadian Electrical Code*.
3. The operation and maintenance of electrical distribution services shall meet the standards of the *Canadian Electrical Code*.
4. Plans and specifications for new electrical facilities and major alterations shall be submitted to the appropriate building owners and municipal or provincial agencies for review and approval.
5. No employee shall install, modify, adjust, test, or repair electrical distribution services unless the employee is a qualified electrician or an apprentice who works under the direct supervision of a qualified electrician.
6. Electrical equipment that is capable of becoming live shall be isolated, locked out, tagged, and tested before work is performed on the equipment.
7. When equipment cannot be locked out, a written SOP (including tagout, testing, and competent worker stand-by) shall be developed to provide an equivalent level of safety to that provided by a lockout procedure.
8. Where more than one employee is performing any work on, or live test of, isolated electrical equipment, a separate tag or sign for each such employee shall be attached to each control device and locking device.

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9. The locations of power lines and cables shall be determined before digging or drilling work is commenced.
10. Energized parts of electrical circuits and equipment shall be guarded by approved cabinets or enclosures.
11. Supervisors shall take measures to protect employees from injury when work must be performed near live electrical equipment.
12. Supervisors shall appoint safety watchers when work must be done near live electrical equipment due to the nature of the work, the condition of the workplace, or the location of the job.
13. Electrical disconnect switches and circuit breakers shall be labeled. Access to electrical switches, control devices, and meters shall be unobstructed.
14. Electrical equipment and appliances shall be CSA approved.
15. Ground fault circuit interrupters (GFCIs) shall be installed on temporary circuits at renovation and construction sites.
16. Electrical tools and equipment used in damp or outdoor environments shall be protected by ground fault circuit interrupters (GFCIs) installed at the receptacle or panel.
17. Working alone is prohibited on energized lines or equipment that exceeds 300 volts.
18. Employees who work regularly around energized electrical equipment or distribution services shall be qualified in cardio-pulmonary resuscitation (CPR).
19. CPES will ensure that electrical equipment shall be of the type and rating approved for the specific purpose for which it is to be used.
20. Defective electrical components and tools will be tagged as unsafe and removed from service.
21. All flammable materials will be stored away from electrical equipment.
22. Proper PPE must be worn for protection from electrical shock and/or arc flash. PPE must cover the entire body when an arc flash boundary has been identified. This may include arc flash suit with flare shield, safety glasses, non-conductive head protection, leather gloves and footwear. Refer to CSA standard Z462.

***Electrical Utilities:***

1. If work is to be conducted on electrical utilities the Prime Contractor shall notify the operator of the utility and arrange for a qualified utility worker to complete the work.
2. The utility operator shall have implemented safe work procedures and make them available to utility workers.
3. The utility operator shall ensure utility workers work in accordance with safe work procedures.
4. The utility worker shall follow the safe work procedures as set out by the utility operator.
5. The employer of the utility worker shall ensure the worker is familiar with and complies with the safe work procedures as set out by the utility operator.
6. Utility workers that are working on or near energized equipment shall wear:
  - a. Clothing next to the skin made of non-melting natural fibers (wool, cotton or of other acceptable fire-retardant material),
  - b. Other clothing made with at least 65% natural fibers;

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- c. No metallic articles in contact with skin,
  - d. Approved industrial protective headgear,
  - e. Long sleeved garments with the garment sleeves rolled down.
7. Where potential for Arc Flash exists, refer to and follow Arc Flash SWP-38.
  8. When working on live lines or electrical equipment a minimum of two (2) qualified utility workers shall be used to perform the work.
  9. If work is to be performed on live lines or electrical equipment at heights, the aerial device used shall be equipped with both upper and lower controls. An additional utility worker that is qualified to operate the lower controls shall also be used.
  10. Utility workers shall not approach or allow conducting objects or equipment to approach closer than the safe limit of approach to exposed energized parts. The safe limit of approach distances for overhead power lines for persons and equipment is presented in the following table.

<i>Operating voltage between conductors of overhead power line</i>	<i>Safe limit of approach distance for persons and equipment</i>
<i>0-750 volts Insulated or polyethylene covered conductors (1)</i>	<i>300 millimeters</i>
<i>0-750 volts Bare, un-insulated</i>	<i>1.0 meter</i>
<i>Above 750 volts Insulated conductors (1) (2)</i>	<i>1.0 meter</i>
<i>750 volts-40 kilovolts</i>	<i>3.0 meters</i>
<i>69 kilovolts, 72 kilovolts</i>	<i>3.5 meters</i>
<i>138 kilovolts, 144 kilovolts</i>	<i>4.0 meters</i>
<i>230 kilovolts, 260 kilovolts</i>	<i>5.0 meters</i>
<i>500 kilovolts</i>	<i>7.0 meters</i>

***Guidelines:***

Electrical contact accidents resulting in lost time injuries or fatalities inevitably exhibit similar sequences of contributing factors: the presence of electricity, faulty or inappropriate equipment, an out-of-the ordinary task, and improvised work procedures. Complicating environmental factors also precipitate misfortune. Common accident scenarios involve contact with overhead electrical wires, failure to use ground fault circuit interrupters (GFCIs), failure to lockout and tagout, and careless use of substandard or unsafe extension cords, inspection lights, and power tools.

A standard 110-volt, 15-amp circuit has the potential to electrocute a person. The human body is extremely variable as a conductor. The effects of an accidental electrical contact depends on the current, the pathway of the current, and the duration of the contact. A current of 1 milliampere (mA) will be barely perceptible; 16 mA can paralyze muscles, so you can't let go, and 20 mA can paralyze the

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respiratory system. Currents of 50 to 60 milliamps can be lethal when there is good ground. Currents exceeding 100 mA can cause heart fibrillation, cardiac arrest, and organ damage.

GFCIs are one means of providing for electrical safety in outdoors or damp environments. Leakage currents of 5 mA will trip a GFCI to prevent shock and electrocution. In addition to leakage problems with power tools and extension cords, ground faults often occur when polarity is reversed due to incorrect wiring when plugs are replaced. GFCIs will safeguard.

Extension cords should not exceed 45 metres in length and their condition should be checked daily. CSA-approved # 12 electrical cords must be used for outdoor work.

Electrical appliances and power tools must be CSA- approved. CSA- approval “for outdoor use” would be an appropriate standard for damp environments. The CSA mark is a recognized symbol of safety for electrical, plumbing, and mechanical products.

- For further information, visit the web site: **www.csa-international.org**.

All electrical distribution services must be designed, installed, and inspected in accordance with the requirements of the *Canadian Electrical Code*. CSA-approved materials and equipment must be used for electrical safety.

To make arrangements for an inspection of electrical equipment by Ontario Hydro or by an approved electrical inspector, contact the Supervisor of the University’s Electrical Shop.

- For additional guidance on safe work procedures, see Safety Policy 851.06.01 concerning Lockout/Tagout and Safety Policy 851.06.22 concerning Standard Operating Procedures.

**REGULATIONS**

**Alberta OHS Code**

**Saskatchewan OHS Regulation**

**British Columbia OHS Regulation**

**REFERENCES / ADDITIONAL INFORMATION**

Alberta Electrical and Communication Utility Code

Developed by:	1.	Aurelia Pascale	2.	Marty Fulkerth	Date:	Sept 15, 2010
	3.	_____	4.	_____		
Revised by:	1.	HSE Department	2.	Todd Penney	Date:	May 1, 2012
	3.	Ryan Obleman			Date:	April 18, 2018