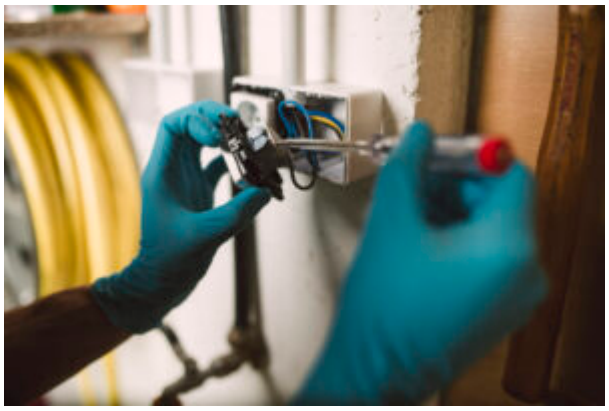
Electrical Work Safety Policy



Work performed on energized electrical equipment is extremely hazardous and subject to strict regulations under not just OHS regulations but also other laws and standards, including the Canadian Electrical Code and CSA Z462. Here's a general policy template outlining the required safety measures for such work based on Ontario law. **Caveat:** Electrical safety policies aren't one size fits all and you'll need to adapt this template to the specific conditions, hazards, work operations, safety protocols and other circumstances that pertain to your own workplace, particularly if you're not in Ontario.

1. **PURPOSE**

ABC Company has adopted this Policy to prevent electrical injuries and property damage and ensure compliance with the *Canadian Electrical Code* (CEC), [*province*] *Occupational Health and Safety Act* ('Act'), the *Occupational Health and Safety Regulations* ('Regulations'), applicable provincial safety laws governing electrical work, the ABC Company Occupational Health and Safety Program ('OHS Program') and other applicable requirements standards for electrical safety at ABC Company workplaces.

2. **POLICY**

All electrical work performed at ABC Company workplaces must be carried out safely and in accordance with the requirements of the CEC, the Act, the Regulations, the OHS Program, and other electrical safety standards that apply.

3. **DEFINITIONS**

The following definitions apply for the purposes of this Policy:

Affected worker: a worker who is not directly involved in the work requiring the hazardous energy control, but who is (or may be) located in the work area;

Arc flash hazard: a dangerous condition associated with the possible release of energy caused by an electric arc;

Authorized worker: a worker who is qualified because of knowledge, training, and experience and has been assigned to perform lockout;

Boundary, arc flash protection: when an arc flash hazard exists, an approach limit at a distance from a prospective arc source within which a person could receive a second degree burn if an electrical arc flash were to occur;

Boundary, limited approach: an approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists;

De-energize: shutting off the energy sources to circuits and equipment and depleting any stored energy;

Energized: machines and equipment are energized when they are connected to an energy source or contain residual or stored energy;

Energy-isolating device: a mechanical device (e.g., a disconnect switch, line valve, block, blank off plate) that physically prevents the transmission or release of an energy source to machinery or equipment;

Guarded: covered, shielded, fenced, enclosed, or otherwise protected by suitable covers, casings, barriers, rails, screens, mats, platforms, or other equally effective means;

High voltage: any voltage exceeding 750 V;

Low voltage: any voltage exceeding 30 V but not exceeding 750 V;

Lockout: a device that uses a positive means (such as a lock) to hold an energy-isolation device in a safe position and prevents the energizing of a machine or a piece of equipment;

Practicable: possible given current knowledge, technology and invention;

Qualified (Electrical) Worker: a qualified person trained and knowledgeable of construction and operation of equipment or a specific work method and is trained to recognize and avoid the electrical hazards that might be present with respect to that equipment or work method, including an employee while undergoing on-the-job training has performed duties safely at their level of training and who is under the direct supervision of a qualified person; **Note:** A person may be considered qualified for certain equipment and methods but unqualified for others.

Reasonably practicable: practicable unless the person on whom a duty is placed can show that there is a gross disproportion between the benefit of the duty and the cost, in time, trouble and money, of the measures to secure the duty;

Zero Energy State: an energy level that is not harmful to an individual. Methods for achieving a zero-energy state in a system include de-energization of electrical sources and discharging of capacitive and inductive elements (absence of voltage and current), blocking or total release of mechanical energy (kinetic or potential), and dissipating chemical or thermal energy.

4. WORKERS THIS POLICY IS INTENDED TO PROTECT

ABC Company is committed to protecting the health and safety of **all workers** at its site regardless of who pays or employs them. Accordingly, this Policy is intended to protect:

- Full- or part-time workers employed by ABC Company;
- Temporary employees placed by an outside agency to work at the site;
- Contract labourers engaged to perform work at the site;
- Volunteers who work at the site for free; and
- Workers employed by prime contractors, contractors, and subcontractors to perform work at the site under a contract with ABC Company.

5. ELECTRICAL HAZARD ASSESSMENT

To provide for electrical safety, ABC Company **will ensure** electrical hazard assessments are carried out. Electrical hazards identified during hazard assessment are rated as a high priority for purposes of determining corrective measures.

6. WORKERS THATCAN PERFORM ELECTRICAL WORK

Only a qualified electrical worker is allowed to work on energized circuits. Qualified electrical workers must not be assigned to work alone, except for replacing fuses, operating switches, or other operations that do not require the worker to contact energized high voltage conductors or energized parts of equipment, clearing trouble, or emergencies involving hazard to life or property. All unqualified workers are strictly forbidden from coming into contact or working near open energized equipment.

7. WARNING SIGNS

An entrance to a room or similar enclosure containing exposed live electrical parts must have a

conspicuous sign that warns of the danger and bans entry by unauthorized persons.

8. LOCKING OUT

8.1 When Lockout Is Required

The power supply to electrical installations, equipment or conductors must 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. Before starting the work, each worker must that the above

requirements have been met.

8.2 When Lockout Is Not Required

Locking out is not required if either:

- The conductors are adequately grounded with a visible grounding mechanism; or
- 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 isn’t inadvertently energized.

(4) If locking out isn’t required for the reason set out in the second bullet, ABC Company will take steps to ensure that the required procedures referred to in that bullet are carried out.

8.3 Lockout Tagout Protocols

If more than one worker is involved in the work referred to in subsection 8.1, the worker who

disconnected and locked out the power supply must communicate the purpose and status of the

disconnecting and locking out. If a tag is used as a means of communication, it must:

- Be made of non-conducting material;
- Be secured to prevent its inadvertent removal;
- Be placed in a conspicuous location;
- State the reason the switch is disconnected and locked out;
- Show the name of the worker who disconnected and locked out the switch; and
- Show the date on which the switch was disconnected and locked out. O. Reg.

8.4 Alternative Protocols for When Lockout Isn’t Practicable

If it’s not practicable 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, workers must use rubber gloves, mats, shields and other protective equipment and procedures adequate to ensure protection from electrical shock and burns while performing the work. If the installation, equipment or conductor is operating at a nominal voltage of 300 volts or more,

a suitably equipped competent person who’s able to recognize the hazards and perform rescue

operations, including artificial respiration, must be available and able to see the worker performing the work. **Exception:** The immediate requirement related to installation, equipment or conductors operating at nominal voltage of 300 volts or more doesn’t apply to equipment testing and trouble-shooting operations.

8.5 High Voltage Work

Work performed on electrical transmission systems or outdoor distribution systems rated at

more than 750 volts must be performed in accordance with the requirements set out in ‘Electrical Utility

Safety Rules’, published by the Infrastructure Health and Safety Association (IHSA) and revised in 2019.

9. TOOLS & EQUIPMENT

Tools and other equipment capable of conducting electricity and endangering a worker’s safety

may not be used in such proximity to any live electrical installation or equipment where they might make electrical contact with the live conductor. Cord-connected electrical equipment and tools must have a casing that’ adequately grounded, other than: i. cord-connected electrical equipment or tools that are adequately double-insulated and whose insulated casing shows no evidence of cracks or defects; or ii. a portable electrical generator in which the electrical equipment or tools aren’t 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.

Portable electrical tools used outdoors or in wet locations must be protected by a ground fault circuit interrupter installed at the receptacle or on the circuit at the panel. A ground fault that may pose a hazard must be investigated and immediately removed from service.

10. PORTABLE ELECTRICAL EQUIPMENT & EXTENSION CORDS

10.1 General Requirements

All electrical equipment including extension cords, power bars and portable equipment must have an approved CSA label and be properly maintained in good working condition. Workers must inspect their electrical equipment each time before they use it. Equipment that’s damaged must immediately be taken out of service and either destroyed to prevent accidental use or tagged as being damaged and warning against its use.

10.2 Cord-and-Plug Connected Equipment

Extension cords may be used only to provide temporary power and must not be used as permanent wiring. In addition:

- Extension cords must be of the three-wire type;
- Extension cords and flexible cords must be designed for hard or extra hard usage with the rating or approval visible;
- Job-made extension cords are not allowed;
- A Class A ground-fault circuit interrupter (GFCI) must be provided for renovation or construction sites, or work in outdoor or damp/wet locations;
- Extension cords should be plugged in to a Class A GFCI, or an in-line GFCI plugged directly into the supply receptacle if a Class A GFCI isn’t available;
- Flexible electric cords connected to equipment must not be used for raising

or lowering the equipment;
- Cords must be covered by a cord protector or tape when they extend into a walkway or travel path to avoid creating a trip hazard;
- Extension cords used with grounding-type equipment must accept a three-prong, or grounded, plug;
- Attachment plugs and receptacles may not be connected or altered to interrupt the continuity of the equipment grounding conductor;
- Clipping the grounding prong from an electrical plug is not allowed;
- Flexible cords may be plugged only into grounded receptacles;
- The continuity of the ground in a two-prong outlet must be verified before use;
- Adapters that interrupt the continuity of the equipment grounding connection may not be used;
- Portable electric equipment and flexible cords used in water or other highly conductive work locations or locations where workers are likely to contact water or conductive liquids must be approved for use in those locations;
- Workers must ensure their hands are dry when plugging/unplugging flexible cords and cord-and-plug connected equipment if energized equipment is involved;
- The energized plug and receptacle connections must be handled only with insulating protective equipment if the connection could provide a conducting path to hands, such as if a cord connector is wet;
- While working outside, workers must:
    - Plug into a Class ‘A’ GFCI;
    - Use heavy duty grade cords designed for outdoor use;
    - Use heavier gauge wire for longer runs or bigger tools;
    - Protect cords from water, pedestrian and vehicle traffic, closing doors and windows;
    - Check tool ground pin or on double-insulated tools to ensure that casing is not cracked;
- Locking-type connectors must be properly locked into the connector;
- Lamps for general illumination must be protected from breakage and metal shell sockets must be grounded;
- Temporary lights must not be suspended by their cords unless they’re designed for

this purpose;

- Portable lighting used in wet or conductive locations must either be: i. operated at no more than 12 volts, or ii. protected by GFCIs.

10.3 Temporary Wiring

Temporary electrical power and lighting installations 600 volts or less, including flexible cords, cables and extension cords, may only be used during renovation, maintenance or repair. In addition:

- Ground-fault protection (Class A) must be provided on all temporary-wiring circuits, including extension cords, used on construction sites;
- All equipment and tools connected by cord and plug must be grounded (grounding isn’t required for listed or labeled double insulated tools and appliances);
- Feeders must originate in an approved distribution center, such as a panel

board, that’s rated for the voltages and currents the system is expected to carry;
- Branch circuits must originate in an approved power outlet or panel board;
- Bare conductors or earth returns may not be used for wiring of any temporary circuit;
- Receptacles must be of the grounding type;
- Flexible cords and cables must be of an approved type and suitable for the location and intended use and may not be used as a substitute for the fixed wiring;
- Suitable disconnecting switches or plug connects must be installed to permit the disconnection of all ungrounded conductors of each temporary circuit;
- Lamps for general illumination must be protected from accidental contact or damage, either by elevating the fixture or by providing a suitable guard;
- Hand lamps supplied by flexible cord must be equipped with a handle of molded composition or other approved material and must be equipped with a protective guard;
- Flexible cords and cables must be protected from accidental damage;
- Steps must be taken to prevent sharp corners and projections are to be avoided;
- Flexible cords and cables that pass-through doorways or other pinch points must be protected from damage.

11. PORTABLE GENERATORS

Portable generators with no connection between the neutral and the case may not be used as stand-alone electric supply for operation of portable equipment. Labeling on newer portable generators must indicate the status of the neutral conductor and shall be marked on each machine as follows:

NEUTRAL FLOATING or NEUTRAL BONDED TO FRAME

12. AVOIDANCE OF WET & CONDUCTIVE LOCATIONS

Where practicable, work in wet or conductive locations should be avoided. The use of portable tools and equipment powered by sources other than 120 V ac (e.g., batteries, air, hydraulics) should be minimized in wet or conductive locations. Where working in a damp or wet location can’t be avoided, a ground-fault circuit interrupter (GFCI) Class A must be provided. Where possible, water should be removed and fans/dehumidifiers used to promote drying should be used before work begins.

13. SAFETY RULES FOR WORK ON DE-ENERGIZED SYSTEMS

All electric circuits must be assumed to be energized unless each involved worker ensures they are not.

Every circuit and conductor must be tested every time work is done on them.

Proper PPE must be worn until the equipment is proven to be de-energized, including:

- Voltage-rated gloves;
- Leather protectors;
- Electrically insulated shoes;
- Approved insulating mats;
- Safety glasses; and
- Appropriate Arc Flash PPE

The following steps must be taken to ensure conditions for electrically safe work:

Step 1: Check up-to-date drawings, diagrams, and identification tags to identify all sources of power to the equipment.

Step 2: Remove the load current, and then open the disconnecting devices for each power source.

Step 3: If practicable, visually verify that blades of disconnecting devices are fully open or that draw out-type circuit breakers are fully withdrawn.

Step 4: Apply lockout/tag out devices in accordance with ABC Company's lockout tagout policies and procedures.

Step 5: Test each phase conductor or circuit part with an adequately rated voltage detector to verify that the equipment is de-energized. Test each phase conductor or circuit part both phase-to-phase and phase-to-ground. Check the voltage detector before and after each test to ensure it's working.

Step 6: Properly ground all possible sources of induced voltage and stored electric energy before touching. Apply ground-connecting devices rated for the available fault current if conductors or circuit parts that are being de-energized may contact other exposed conductors or circuit parts.

14. SAFETY RULES FOR WORKING ON OR NEAR ENERGIZED EQUIPMENT

For purposes of this Section, **working on** live circuits means actually touching energized parts; **working near** live circuits means working close enough to energized parts to pose a risk even though work is on de-energized parts.

14.1 General

Where practicable, work on energized equipment should be avoided and efforts should be made to turn off the power or isolate the power source before starting work. If it's not practicable to turn off or isolate the power, work on energized equipment is permitted only if:

- The equipment is rated at a nominal voltage of 600 volts or less AND disconnecting would create a greater hazard than proceeding without disconnecting it;
- The work consists of diagnostic testing ONLY.

If the work (other than diagnostic work) involves a nominal voltage above 300

volts, an adequately equipped competent worker must be stationed in view of the worker to perform rescue operations, including CPR.

14.2 Permits

A written electrical safety work permit is required in the circumstances outlined in CSA Z462-21. Work related to testing, troubleshooting, and voltage measuring may be completed without a permit provided appropriate safe work practices and PPE are used. The permit must be issued by the qualified electrical worker, posted in an appropriate location where the energized work occurs for the duration of the task and maintained for one year after the work has been completed. Work permits are NOT required if a qualified person is provided with and uses appropriate safe work practices for engaging in:

- Testing, troubleshooting or voltage measuring;
- Thermography, ultrasound or visual inspections if the restricted approach boundary is NOT crossed;
- Access/egress into an area with energized equipment if no electrical work is performed and the restricted approach boundary is not crossed;
- General housekeeping and miscellaneous non-electrical activities if the restricted approach boundary is not crossed.

14.3 Limits of Approach

Energized electrical conductors and circuit parts operating at voltages > 30 V ac or 60 V dc must be put into an electrically safe condition before a worker works within the following limited approach boundary of those conductor parts.

1. **Restricted approach boundary** is the distance from an exposed energized electrical conductor or circuit part within which there is an increased likelihood of electric shock, due to electrical arc over combined with movement. To cross the restricted approach boundary, the qualified person must:

- Have an energized work permit approved by the responsible supervisor or manager;
- Use PPE suitable for working near exposed lived parts and rated for the voltage and energy level involved;
- Minimize the likelihood of bodily contact with exposed energized conductors and circuit parts from inadvertent movement by keeping as much of the body out of the restricted space as much as possible, using only protected body parts in the space to the extent necessary to accomplish the work;
- Use insulated tools and equipment; and
- Not approach or bring conductive objects within the restricted approach boundary > 30 V ac or 60 V dc unless CSA-Z462 requirements are followed.

1. **Limited approach boundary** is the distance from an exposed live part within which a shock hazard exists. Workers may not cross the limited approach boundary unless they are trained and qualified for the task which includes being able to identify the hazards and associated risks. To cross the limited approach boundary, the qualified person must wear flash protective equipment. Unqualified persons should generally not work near or close to the boundary, but if they do a qualified person must advise them to stay outside of the boundary.
2. **Arc flash boundary** is the approach limit at a distance from exposed live

parts within which someone could receive a second degree burn if an electrical arc flash were to occur. The arc flash boundary is defined as the approach limit from an arc source at which incident energy equals 1.2 cal/cm2 (5 J/cm2). Rules:

- Use of PPE appropriate for working near exposed live parts and rated for the voltage and energy level involved is required;
- For systems of 600 volts and less, the flash protection boundary is 4 feet, based on an available bolted fault current of 50 kA and a clearing time of 6 cycles for the circuit breaker to act, or any combination of fault currents and clearing times not exceeding 300 kA cycles;
- Labels on panels containing information about energies and boundaries must be checked before starting work;
- When working on de-energized parts and inside the flash protection boundary for nearby live exposed parts, if the parts can't be de-energized, barriers such as insulated blankets must be used to protect against accidental contact or the worker must wear proper PPE;
- When working near exposed live parts, suitable safe work zone barriers must be provided to maintain a safe distance for non-workers in the area.

15. EQUIPMENT ARC FLASH LABELING

Equipment must be field marked with a label specifying the: i. Available incident energy or required level of personal protective equipment; and ii. Date of evaluation.

15.1 CSA Z462-1 Requirements

Labels must meet the following CSA Z462-21 requirements:

- Label content must consist of a signal word panel ('DANGER', 'WARNING', or 'CAUTION') plus a message panel (concise explanation of the hazard). The signal word panel may include a safety alert symbol (triangle and exclamation mark). The label may also include a safety symbol panel (a symbol that effectively communicates the message in the message panel).
- Where used, a safety alert symbol must precede the signal word with the base of the symbol on the same horizontal line as the base of the signal word and the height of the symbol equal to or greater than the signal word.
- The label may include a contrasting border.
- Danger labels must have the word 'DANGER' in safety white letters on a safety red background.
- Warning labels must have the word 'WARNING' in safety black letters on a safety white background.
- If used, a safety alert symbol must be the same colour as the signal word lettering and the exclamation mark needs to be the same colour as the signal word panel background.
- The label must be readily visible to and alert the worker to the potential hazard in time to take appropriate action.

15.2 Arc Flash Label

When a detailed arc flash hazard analysis has been completed, a detailed label may be used to provide additional information, which typically consists of four

sections that contain:

- The information from the label required by Rule 2-306 of the Canadian Electrical Code, Part I;
- Information on arc flash hazards, such as arc flash protection boundary distances and the required PPE;
- Information on electrical shock hazards, such as voltage level, safe approach distances and insulation value of insulating tools and required PPE;
- Information on the designation of the equipment, the name of the individual or company that performed the analysis, the power system study file designation and the date the analysis was completed.

15.3 Labeling Procedures

Switchboards, panel boards, industrial control panels, and motor control centers must be field marked to warn workers of potential electric arc flash hazards. Markings (labels) must be located where they’re visible to the personnel before examination, adjustment, servicing, or maintenance of the equipment. The first, ‘WARNING or DANGER’ label must be used when information is not presently available. The DANGER label should remind a qualified worker who intends to open the equipment for analysis or work:

- That electric arc flash hazard exists;
- To turn off all power before opening;
- To follow all CSA Z462-21 safe work practice requirements;
- To wear appropriate PPE.

The second DANGER label must be used when a qualified electrical worker or electrical engineer determines the values of the shock and flash protection information. When arc flash and shock data are available for industrial control panels, labels must include information on flash hazard boundary, the hazard category, required PPE, minimum arc rating, limited approach distances, restricted approach distances and prohibited approach distances.

16. POLICY MONITORING & EVALUATION

This Policy will be reviewed, in consultation with the JHSC or Representative, at least once a year and more often in response to incidents, injuries, illnesses, and changes affecting workers’ health and safety.