
 <b>HEALTH, SAFETY &amp; ENVIRONMENTAL MANUAL</b>	<b>11.4 Electrical Safety Program</b>				
	Initial HIRA Score:	<b>15</b>	Residual HIRA Score:	<b>10</b>	Critical Task: <b>Yes</b>
	Procedures: <b>12.11.4</b>				
	Revision Number: <b>R0</b>		Number of Pages: <b>30</b>		
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## ELECTRICAL SAFETY PROGRAM

### PURPOSE

This section is intended to ensure that every reasonable precaution shall be taken to control hazards to workers due to energized electrical equipment.

An electrical hazard can be defined as:

- a dangerous condition where a worker could make electrical contact with energized equipment or a conductor, and from which the person may sustain an injury from shock and/or;
- there is potential for the worker to receive an arc flash burn, thermal burn, or blast injury.



**Electric shock** is the passing of electric current through the body.

An **arc flash** is a release of energy caused by an electric arc. The flash causes an explosive expansion of air and metal.

Where appropriate a set of written procedures shall be available on a project to ensure that no part of a vehicle or equipment or its load encroaches on the minimum distance permitted (see table and procedure below).

**Note:** No equipment or vehicle shall be brought closer to overhead electrical wires set out in the following table: (Section 188(2) of the OHS Regulations for Construction Projects).

Nominal Phase to Phase Voltage Rating	Minimum Distance
750 or more volts, but no more than 150,000 volts	3 meters
More than 150,000 volts, but no more than 250,000 volts	4.5 meters
More than 250,000 volts	6 meters

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### SCOPE

**Supervisors shall ensure:**

- All locates are completed prior to job start.
- Place warning signs where required. Overhead wires may be fitted with orange warning flags where necessary.
- Voltages for overhead wires are determined by the utility and recorded on the hazard plan.
- Signallers are given written instructions for their duties on the electrical hazard plan.
- Complete the electrical hazard plan whenever it is required. Use the HCCS Forms app. Hard copies may be necessary for the operator and signaller.
- To be aware of contact when moving extension ladders, long lengths of pipe etc. as well as vehicles or equipment.



### PROCEDURE

If a piece of equipment or vehicle may have the potential of encroaching the minimum allowable distance to an overhead wire, the following procedures are required:

- Arrange for a competent signaller to assist the operator/driver.
- Notify the operator/driver (in writing on plan) of the electrical hazard before work starts.
- Provide enough warning devices / signs in the vicinity of the hazard so at least one is always visible to warn the operator.
- Ensure a sign or sticker is visible at the operator's station (i.e. cab) warning of the hazard.
- Review the "Electrical Hazard Plan" with operators, workers and subcontractors affected on the project. Everyone signs the plan. Use the HCSS Forms app. Provide hard copies, if necessary.
- Ensure that affected workers and operators are familiar with these procedures and will not proceed with the work until they are fully implemented.

**General electrical safety – tools, cords, generators**

- Use only tools that are polarized or double insulated. Make sure the casings of double-insulated tools are not cracked or broken.
- Make sure that tool cords, extension cords, and plugs are in good condition.
- Use only 3-pronged extension cords.
- Make sure that extension cords are the right gauge for the job to prevent overheating, voltage drops, and tool burnout. A 12-gauge extension cord is ideal.
- Receptacles must be GFCI-protected.
- Use only generators with neutral bonded to frame.
- Always use a Type A ground fault circuit interrupter (GFCI) with portable electric tools used outdoors or in damp or wet locations. GFCIs detect current leaking to ground from a tool or cord and shut off power before damage or injury can occur.

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### Rescue Procedures

When an electrical incident occurs, the victim may be incapable of moving or releasing the electrical conductor because of the effect of something called “muscle clamping.” Muscle clamping is the contraction of muscles caused by an electrical current running through the body. As a result of this effect, attempts to rescue a victim of an electrical incident may pose a hazard for the rescuer. A rescuer who touches a victim who is still in contact with an electrical current could also be exposed to that current. Caution will always be a primary consideration during rescue in response to any electrical emergency. At the same time, speedy and effective response is essential, because to survive, victims shall be rescued as soon as possible. Workers shall understand electrical hazards and know how to act fast and safely in an electrical emergency.

The first rule of electrical rescue is that co-workers must never rush into an emergency situation. Follow these procedures:

- Call 911
- Visually examine victims to determine if they are in contact with energized conductors. Metal surfaces, objects near the victim, or the ground itself may be energized.
- Responders could become victims if they touch an energized victim or conductive surface. Any active electrical circuits will be de-energized, if possible.
- Once the power is off and it is safe to approach, the victim can be examined to see if they can be safely moved without causing greater injuries.
- If the electrical circuit cannot be de-energized, emergency responders shall use extreme care. They must:
  - Ensure that hands and feet are dry.
  - Wear protective equipment such as low-voltage gloves and overshoes, if available.
  - Stand on a clean, dry surface, or stand on a dry rubber blanket or other insulating material, if possible.
  - Use a nonconductive material (ie. nonconductive rope, or a dry stick or board) to remove the victim from the conductor.

First aid for a victim of an electrical incident may include CPR if the person is not breathing and has no pulse. If the victim is breathing and has a heartbeat, first aid for shock and burns may be required until emergency medical help arrives.

### TRAINING REQUIREMENTS

Every worker who acts as a signaller will be competent, receive instructions and follow the electrical hazard plan and procedures.



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### LEGISLATION

Construction Regulations 213/91, Sections 187-189

### ELECTRICAL HAZARD PLAN

Project Name/Number: \_\_\_\_\_

Date/Duration of Possible Hazard: \_\_\_\_\_

Supervisor: Name \_\_\_\_\_ Signature: \_\_\_\_\_

Location of Overhead Conductors (use diagram if needed): \_\_\_\_\_

Voltage: \_\_\_\_\_ Minimum Distance 3m 4.5m or 6m

#### PROCEDURES USED TO PROTECT AGAINST ELECTRICAL HAZARDS (all boxes must be checked)

Sign / sticker posted at operator's station (cab)  Arranged for signaller

Warning devices / signs at hazard location



Equipment Unit # / Description: \_\_\_\_\_  
(working with signaller)

Any Other Procedures Explained: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**By signing below, I acknowledge that I understand the potential electrical hazards described in this plan and will comply with the procedures used to protect against these hazards:**

Position	Name	Signature	Date
Operator			
Signaller			

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### ELECTRICAL UTILITY SAFETY

All of the following safety guidelines are taken from IHSA's "*Electrical Utility Safety Rules: IHSA, Jan 2024.*" Some of these guidelines may not apply to the current J-AAR Utilities scope of work but are made available for reference.

### SCOPE

#### Electrical Safety

##### Electrical Utility Safety Rules: IHSA, Jan 2024

These safety rules (revised January 2024) are for the purpose of preventing personal injury, illness and property damage. However, be aware that the rules expressed are minimum requirements for the workplace and for public safety.

These rules were revised with input from key stakeholders and the dedicated efforts of a Joint Working Team made up of representatives from Hydro One Inc. and the Infrastructure Health & Safety Association (IHSA). The Electrical Utility Safety Rules reflect the experience of the membership and others of the industry, and the knowledge to identify, eliminate and control hazards and prevent injuries and illnesses. In addition to these rules, the current Ontario *Occupational Health and Safety Act* (OHSA) and Regulations outline specific duties and responsibilities of employers and workers. These safety rules must be used in conjunction with existing federal and provincial health and safety regulations.

The following safety rules have been designed primarily for work in the electrical utility industry. However, the rules apply equally well to any work performed on or in proximity to electrical transmission or distribution systems or apparatus. These rules are in addition to all other pertinent safety rules and are to be used to comply with current Regulations made under the Ontario *Occupational Health and Safety Act* and all other applicable legislation in Ontario.



### PROCEDURES

#### General

1. The first consideration by **workers** in the course of their work must be the safeguarding of life and the avoidance of personal injury.

#### Employer's Management of Rules

The employer shall establish a written policy and procedure to manage these safety rules and to ensure they are correctly applied. The policy must deal with resolving disagreements on the interpretation of a rule. If it becomes necessary to depart from any portion of the rules, the departure must, result in a level of safety equal to or greater than that provided by the Electrical Utility Safety Rules; be fully documented and approved by the employer, and be sent to the Joint Health and Safety Committee or the Health and Safety Representative, if any, for the workplace.

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### Policy

The J-AAR Utilities Manager is responsible to understand, review and manage the safety rules and the procedures detailed in this program and ensure they are applied correctly. They are also responsible to ensure any disagreements on the interpretation of the rules or procedures are resolved correctly. The program will be reviewed at least annually. When issues or disagreements arise, the utilities manager will document all resolutions.

### 102 Knowledge of Rules

Workers conducting work on or in proximity to exposed apparatus of an electrical distribution or transmission system shall have a copy of these safety rules. Workers shall be trained in the application of the rules. Workers shall follow all rules applicable to their particular duties and to the duties of any employee they supervise.

### Authorization for Work

Only authorized workers or workers under the direction of an authorized worker may perform work on or in proximity to exposed energized apparatus.

### 107 Job Planning

1. a) All work must be properly planned and communicated, considering all workers, the public, approved work procedures, equipment, and the physical and environmental conditions at the workplace. The purpose of this process is to establish a safe work area by identifying the job steps, hazards, and appropriate barriers. The steps to be taken in case of an emergency shall also be documented.



b) Barriers used to protect against electrical hazards must be made of materials having an adequate electrical insulation value, and barriers used to protect against mechanical hazards must be of adequate strength for the purpose intended. Visual barriers must be used wherever practical to clearly identify the safe work area(s) for the worker(s), and/or to restrict access to unauthorized people.

c) Visual barriers must be:

- made of approved materials.
- posted with the appropriate warnings.
- installed before the work begins.
- respected in the same manner as other safety barriers.

2. A documented job plan (JHA) must be completed, agreed to, and signed, either electronically or written, by each worker, confirming understanding prior to the performance of all tasks:

- on or in proximity to energized electrical equipment;

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- requiring the establishment of work protection; or
- involving critical hazards such as, but not limited to, falling, hoisting, confined space, hazardous substance, etc.

3. If a change is encountered in the job, work must stop, and the new hazard must be identified and eliminated or controlled. The revised job plan must be communicated, agreed to and signed, either electronically or written, by each worker and where necessary to the controlling authority before restarting work.

4. The controlling authority shall be notified of work location and duration of work when work is performed on or in proximity to equipment energized above 750 V.

5. A means of communication shall be readily available at all times between the controlling authority and any work crews performing work in proximity to apparatus energized above 750 V.

### Weather Conditions

1. When weather conditions make the job unduly hazardous, work must be suspended immediately.

2. All work on or near apparatus where a lightning strike may cause personal injury will be suspended immediately whenever deemed to be unsafe by the onsite supervisor/worker.

### 109 Operating Maps and Component Nomenclature

1. All electrical components used in the control of an electrical transmission, distribution or generating system, including non-utility generation, must be identified, and appropriately labelled with legible nomenclature.



2. Up-to-date operating maps and diagrams must be readily available to workers for all locations where work is being performed.

### First Aid

1. Employers must develop and maintain an emergency response capability in their workplaces, including the training of personnel to meet all the requirements of the Workplace Safety and Insurance Act and all applicable current legislation.

2. A list of names and telephone numbers of ambulance services, hospitals, fire departments, police, and members of the company who are to be called in emergencies shall be provided at the work location.

3. First aid training must include the module of CPR and AED.

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4. First aid kits meeting Workplace Safety and Insurance Act standards shall be maintained and suitably located in all workplaces and vehicles.

5. AED's must be provided, maintained and suitably located on site when 2 or more workers are working in an energized electrical environment.

### **111 Emergency Response**

1. Workplaces must have an emergency response plan and the plan shall be posted in a conspicuous location at the workplace or project.

2. All workers must be instructed in the emergency response plan and must practice it at regular intervals.

3. If an emergency makes it necessary to deviate from these safety rules, the worker(s) performing the work shall take every precaution reasonable in the circumstances to protect all workers and the general public by maintaining a safe work environment.

4. If a worker takes immediate action in an emergency to safeguard life or property, it must be followed promptly with a report to his/her supervisor, stating the action taken and the reasons for it.

### **112 Rescue Operations**

1. Each employer shall establish written policies and procedures for performing rescue operations. All appropriate workers and their supervisor(s) shall be familiar with, and competent in, the execution of the rescue technique, including first aid, CPR and AED.



2. Employees who may be required to perform a rescue shall be trained in the appropriate rescue procedure for the work being performed.

3. To ensure competency is maintained, the minimum requirement is to perform at least one practice session per year for each specific rescue procedure that may be required in the performance of duties.

4. All rescue procedure training and practice sessions shall be documented, and records kept.

5. A synthetic rescue rope or mechanical device approved for rescue purposes shall be conspicuously located and readily available where crews are engaged in overhead or underground work operations. The rope shall be designed for life saving purposes and shall have a minimum breaking strength (MBS) of 2,300 kilograms (5,000 pounds).



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### Arc Rated/Flame Resistant Protective Equipment

When workers are required to perform work on exposed energized apparatus or where exposure to an arc flash hazard exists, all practical measures shall be taken to protect workers against the effects of electric arc flash.

1. When working on or in proximity to exposed energized apparatus,
  - a) The AR/FR clothing and approved protective equipment selected must provide an adequate level of protection to protect the worker.
  - b) The outer layer of clothing must be made of AR/FR material.
  - c) Clothing worn in conjunction with AR/FR clothing must not contribute to increased worker injury.
  - d) AR/FR clothing, foul-weather clothing and protective equipment must be manufactured, tested and maintained to current recognized industry standards. Workers shall wear approved eye protection in all circumstances where there is a possibility of an electrical flash or arc.
  
2. AR/FR clothing may not be required to be worn for workers working up to the limits as specified in **Rule 129 "Safe Limits of Approach"** for authorized workers if the following requirements are met. The worker,
  - a) is authorized;
  - b) is appropriately trained in the work to be performed; and
  - c) establishes safe conditions of work (see **Rule 114**).

### 114 Safe Conditions for Work

1. Utility Work Protection Code
  - a) All work requiring the application of the **Utility Work Protection Code** must be strictly followed.
  - b) Recertification in the **Utility Work Protection Code** must be completed every 27 months or earlier.
  - c) All **Utility Work Protection Code** training must be given exclusively by Hydro One, IHSA, or IHSA Member Employer(s) who maintain certification through the Train the Trainer program.
  
2. No work shall be done on electrical apparatus, mobile or fixed equipment, mechanical equipment or systems that may have electrical, dynamic, or potential energy, unless safe conditions for work are provided by one or more of the following methods:
  - a) The apparatus is isolated and de-energized in accordance with the **Utility Work Protection Code**.
  - b) Worker protection is provided by an approved isolation procedure as defined in the Utility Work Protection Code.
  - c) The apparatus is physically removed from the immediate vicinity of any source of electrical, dynamic or potential energy, has no ready means of connection, and has had all stored energy discharged.
  - d) Worker protection is provided by an approved practice; the work is performed by an authorized

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worker and all limits of approach are followed as per **Rule 129 "Safe Limits of Approach"**.

### **115 Work on Isolated Circuits**

1. No work shall be performed on an isolated circuit until formal work protection is established and the circuit de-energized in accordance with the **Utility Work Protection Code**.
2. All isolating, de-energizing, tagging, and locking of devices must comply with the provisions of the **Utility Work Protection Code**.

### **116 Work on Neutral Conductors, Buses and Skywires**

1. All work on neutral **conductors**, neutral buses and skywires must be performed in accordance with **Rule 128 "Apparatus to be Treated as Energized"**.
2. When cutting, splicing or repairing a neutral conductor, neutral bus or skywire, the use of adequate jumpers to prevent a potential difference shall be used and installed/removed using approved work procedures.



### **117 Establishment of Hold-Offs**

1. Where the electrical system equipment exists, a hold-off shall be established for equipment protection and must not be used in place of a work permit whenever,
  - a) live line work procedures are being performed;
  - b) stringing, sagging, raising or lowering conductors or stringing ropes in proximity to energized apparatus;
  - c) installing or removing poles that are within the **"Safe Limits of Approach"** as per Rule 129 for **Non-Insulated Booms and Non-Insulated Portion of Aerial Devices**;
  - d) installing or removing loops of airbreak switches, load interrupters, loadbreak switches and bypass tubes;
  - e) installing or removing live line openers (conductor and clamp assembly);
  - f) moving energized cables over 750 V; or
  - g) an employer, supervisor, worker, or controlling authority considers it necessary or it is determined during job planning.

### **118 Static Electricity and Induction**

Workers must identify all sources of static electricity and induction. Approved grounding and bonding procedures must then be used to eliminate or control these hazards.

### **119 Use of Temporary Grounds**



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1. Temporary grounds must be used in accordance with approved grounding/bonding procedures and the ***Utility Work Protection Code***.
2. Potential tests must be performed prior to the application of any grounding or bonding equipment.
3. Equipotential point-of-work grounding shall be the first choice for grounding systems on overhead circuits.
4. Temporary grounding devices must be of adequate current-carrying capacity to withstand the maximum available fault currents.
5. Grounds must be highly visible through the use of a coloured conductor jacket, marker or flag.
6. Temporary grounds must be clean and visually inspected for defects each day prior to use.
7. Temporary grounds must be tested annually and shall be marked with a legible expiry date.
8. Temporary grounds must be applied and removed using live line tools and approved work procedures.
9. No work shall be carried out on de-energized apparatus until a safe work area has been established.
10. Temporary grounds shall not be removed until the workers or the holder requiring the grounds have completed their work, or removal is required by an approved testing procedure.
11. An approved cable-spiking tool shall be used to ensure positive identification before cutting an underground cable with an operating voltage of greater than 750 V.
12. Conductors of all circuits above 300 V nominal, which have the ability to be connected but have not yet been placed in service or released to a controlling authority, must remain de-energized until the conductors are connected for service.

### **120 Electrical-Testing Devices**

1. Only certified and approved electrical-testing devices that have been verified as operational prior to use shall be used when testing electrical apparatus.
2. Electrical-testing devices shall only be used in accordance with the manufacturers' specifications and approved work procedures.

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3. All voltmeters, multimeters, and phase-rotation indicators rated up to 750 volts AC that utilize direct contact to energized equipment shall be equipped with fused leads.



4. All voltmeters and multimeters shall be designed and approved for use on outdoor distribution systems.

### **121 High-Voltage Testing**

1. All high-voltage testing shall be conducted,
  - a) using approved work procedures; and
  - b) where applicable in accordance with the ***Utility Work Protection Code***.
  
2. All portable potential indicators used on voltages greater than 750 V, must be re-certified yearly by a testing facility, or more often if deemed necessary, following the manufacturers' recommendations and shall be marked with a legible test/expiry date.

### **122 Working Alone**

1. A worker must not work alone when,
  - a) conditions for the use of fall arrest, fall restricting or travel restraint systems are required;
  - b) working aloft on a straight or extension ladder before it is secured;
  - c) working on a nominal voltage of 300 V or greater;
  - d) working in proximity to exposed energized apparatus except when meeting conditions in 2 a) below;
  - e) performing switching operations in an underground electrical system that involves the operation of elbows or exposed switching devices;
  - f) working in a confined space;
  - g) patrolling lines if weather conditions or other factors make it potentially hazardous to patrol safely alone and a means of two-way communication cannot be maintained; or
  - h) working in a battery room except when meeting conditions in 2 c). Where the room is partitioned, only the part containing the batteries is considered the battery room.
  
2. Working alone is permitted,
  - a) in proximity to exposed energized apparatus up to the limits as specified in ***Rule 129 "Safe Limits of Approach"*** for authorized workers, when a worker meets the following conditions:
    - is authorized;
    - is appropriately trained in the work to be performed; and
    - safe conditions of work have been established as per Rule 114 a), b), c)
  - b) when operating switches and replacing fuses that are part of an overhead electrical system, while working from the ground;
  - c) for visual inspections in a battery room;

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d) for any work where a hazard assessment determines there are no factors that make it unsafe to work alone.

3. If a worker encounters hazards or conditions that are judged to be unsafe to proceed while working alone, or is not competent to complete the required work alone, the work must not proceed until the concern is resolved.

4. When a second worker is required, they shall be;

- a) knowledgeable in the hazards associated in the task being performed
- b) a suitably equipped competent worker who can perform rescue operations including CPR and AED
- c) available and positioned to see the worker performing the work

5. For work in a confined space, a second worker shall be positioned immediately outside the entrance to the confined space and maintain constant two-way communication with worker(s).

### **123 Aerial Devices/Boom Trucks**

1. Aerial devices/boom trucks shall be operated within,



- a) the limitations of the manufacturers' specifications;
- b) the current legislation; and
- c) the "**Safe Limits of Approach**" (see **Rule 129**).

2. An approved bucket evacuation device (control descent device) shall be carried on each aerial device.

3. When a worker is aloft in an aerial device, a rope of sufficient length to raise a bucket evacuation device shall be carried.

4. Aerial devices, booms, jibs, buckets and liners shall be dielectrically tested at regular intervals as per **Rule 134 "Inspection, Testing and Selection of Live Line Tools, Protective Equipment and Aerial Devices"**, or more often if this equipment become suspect or whenever any insulated component is altered, changed or repaired. All testing shall be performed by a testing facility in accordance with the current applicable National Standards of Canada and manufacturers' specifications.

5. Aerial devices/boom trucks shall be visually inspected for structural, mechanical and hydraulic defects, including holding valve checks, each day, prior to the equipment being used. These inspections shall be performed in accordance with manufacturers' specifications and current legislation, and shall be documented.

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6. Aerial devices used to raise workers aloft for live line work at more than 750 V nominal shall be equipped with upper and lower controls. Lower controls shall be capable of positively overriding upper controls.

7. Workers shall not be allowed to remain in the bucket of an aerial device during emergency lowering operations when pressure on the hydraulic system is manually released.

8. Boom trucks used as person-lifts shall not be simultaneously used for hoisting operations unless specifically designed for that purpose by the manufacturer, and used following approved procedures.

9. Bucket liners shall be used in the buckets of an aerial device when engaged in rubber glove live line techniques and barehand techniques.

10. Prior to commencing work aloft, all boom and bucket covers shall be completely removed.



11. Rubber glove live line work above 15 kV nominal shall not be carried out from extendable boom type aerial devices or boom trucks with insulated boom and bucket attachments unless the unit is specifically designed and certified for the voltage to be worked on.

12. When performing rubber glove live line work up to 15 kV nominal from extendable boom type aerial devices or radial boom derricks with insulated booms, as a minimum, the restricted **“Safe Limits of Approach”** between the worker’s reach and the non-insulated portion of the boom shall be maintained at all times.

13. Aerial devices with upper boom insulation only, and mobile work equipment such as radial boom derricks, augers, cranes, or other hoisting equipment being operated in proximity to energized apparatus operating above 750 V, and where there is a possibility of contact,

- a) shall be adequately grounded unless the equipment is specifically designed and manufactured to be operated without equipment grounds; and
- b) to maintain the equipotential zone the operator shall remain on the operator platform; or where no operator platform is provided, the operator must stand on an approved ground gradient control mat, with an approved connection to the chassis of the vehicle, while handling the controls; and
- c) where two or more aerial devices/boom trucks are within 3 m (10 ft.) of each other, and at least one of the units does not have a certified lower boom insert, the vehicles shall be bonded together and connected to an effective ground.

14. Aerial devices equipped with a lower boom insert and a turret elevator, that are used where the lower boom below the insulated portion is in proximity, shall be adequately grounded.

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15. Auxiliary hydraulic hoses used in proximity must be dielectric, and clearly identified as such and meet approved industry standards.



16. Unless otherwise prescribed by an approved practice or approved work procedure, aerial devices used for rubber glove techniques above 15 kV phase-to-phase, shall be subjected to a metered current leakage test for the voltage to be worked on, immediately prior to commencement of work, and the results recorded.

### **Raising and Lowering of Tools and Material**

1. Where the risk of falling material presents a hazard, overhead protection must be provided. Where this is not practical, the drop zone shall be identified in the job plan and protected by appropriate barriers.
2. Establish communication between ground workers and workers aloft before moving tools and materials.
3. An approved handline must be used for raising or lowering tools and material to workers and only approved tool bags may be used in conjunction with the handline.
4. When in proximity, a safe work area shall be established prior to raising or lowering equipment.
5. Any rope being carried aloft by a worker or attached to an anchor point on a structure where workers are present shall be appropriately controlled.
6. When working in proximity, a second competent worker shall be positioned to prevent any part of the rope from breaching the applicable limit of approach, or the rope shall be securely attached to the structure at a location that will maintain the applicable ***“Safe Limits of Approach”***.
7. When vehicular, machinery or pedestrian traffic is present, and any part of the rope reaches the ground or could be contacted by vehicles or pedestrians, a second worker shall be positioned to prevent any part of the rope from making contact with all vehicular, machinery or pedestrian traffic and/or the use of other protective barriers, barricades, warning signs or other effective barriers to prevent the rope from being contacted by vehicular, machinery or pedestrian traffic.

### **125 Switching Authorization**

1. For authorization to perform switching operations refer to ***Rule 106 “Authorization for Work”***.

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2. Workers must not perform switching operations without approval from the controlling authority, except as allowed by **Rule 111 "Emergency Response"**. If switching operations are completed as per Rule 111, notification must be made as soon as reasonably possible to the controlling authority.

### 126 Switching Operations

1. All switching operations must be performed in accordance with the **Utility Work Protection Code**.
2. Contact points on switches used as isolating devices for the purpose of work protection shall be visually checked as open; or where dependence on switches with concealed contacts is unavoidable, the employer shall have a written procedure describing the alternative method(s) which affords at least equal protection for the worker(s).
3. All switches that have been opened or closed for any reason shall be checked visually or by electronic means to ensure that the proper operation has occurred.
4. Approved live line tools of sufficient length to maintain a safe working distance from exposed energized apparatus shall be used.
5. Workers shall wear all appropriate and approved personal protective equipment during switching operations.
6. Approved ground gradient mats shall be used when standing on the ground and,
  - a) operating air break switches, load interrupters, loadbreak switches; or
  - b) operating motor-operated switches manually.
7. Ground gradient mats are not required when **FRP** live line tools are being used.

### IHSA Supplemental

Rubber gloves shall be worn during all switching operations as follows:



- a) Up to 750 V **nominal**, rubber gloves with a minimum Class 0 rating shall be used.
- b) Above 750 V **nominal**, rubber gloves with a minimum Class 1 rating shall be used.
- c) When within reaching or falling distances above 5 kV **nominal**, rubber gloves with a minimum Class 2 rating shall be used.

### Hydro One Inc. Supplemental

Rubber gloves of a minimum Class 2 shall be worn as an additional barrier when,

- a) operating airbreak switches, load interrupters, load break switches or motor-operated switches manually;



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- b) operating all switching devices in an underground electrical system, such as pad-mount transformers, pole transformers and sectionalizing switches;
- c) operating switches in an overhead electrical system, where the worker would be within the Restricted Zone of exposed electrical apparatus energized at 750 V nominal or greater (see **Rule 129 "Safe Limits of Approach"**); or
- d) using switch sticks under damp or adverse weather conditions.

### **127 Guarding and Safety Interlocking for Personnel Protection**

1. Guards and safety interlocks must not be removed except for troubleshooting and/or testing, and approved work procedures must be used to protect employees and the public from any exposed hazards.
2. Safety interlocks must not be bypassed by the use of devices such as jumpers or spare keys except for the following situations:
  - a) The device to be worked on or operated and the associated interlock system are both contained within an isolated zone; or
  - b) Troubleshooting and/or testing is being performed by a competent worker and the following conditions are met:
    - A documented job plan identifying hazards and the use of barriers to control these hazards has been completed and communicated to all members of the work group; and
    - At least one member of the work group remains within view of the device for which the interlock has been bypassed, and is close enough to prevent any unauthorized personnel from entering the work area.
3. The **safety interlock** system must not be bypassed before the guaranteed isolation zone is established, and it must be returned to service before the isolation is surrendered.

### **Apparatus to be Treated as Energized**

- All electrical apparatus is to be considered energized unless,
- a) the apparatus is isolated and de-energized in accordance with the **Utility Work Protection Code**; or
  - b) the equipment is physically removed from the immediate vicinity of any source of electrical, dynamic or potential energy, has no ready means of connection, and has had all stored energy discharged.

### **Safe Limits of Approach**

The limits specified in the following table are the minimum requirements. To obtain the safest work environment, **workers** must maintain maximum clearance and use equipment and procedures adequate to protect against electrical shock or burns.



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Limits of Approach						
Maintain Maximum Clearances and Install Barriers Where Practical						
Voltages	Personnel Zones			Mobile Work Equipment		
	OHSA Minimum	Authorized Worker	Restricted Zone	OHSA	Non-Insulated Boom	Certified Insulated Aerial Device
750 V to 15 kV	> 3.0 m (10 ft.)	> 0.9 m (3 ft.)	0.9 m to 0.3 m (3 ft. to 1 ft.)	> 3.0 m (10 ft.)	> 0.9 m (3 ft.)	> 0.3 m (1 ft.)
> 15 kV to 35 kV			0.9 m to 0.45 m (3 ft. to 1.5 ft.)			> 0.45 m (1.5 ft.)
> 35 kV to 50 kV		> 1.2 m (4 ft.)	1.2 m to 0.6 m (4 ft. to 2 ft.)		> 1.2 m (4 ft.)	> 0.9 m (3 ft.)
> 50 kV to 150 kV		> 1.5 m (5 ft.)	1.5 m to 0.9 m (5 ft. to 3 ft.)		> 2.4 m (8 ft.)	> 1.2 m (4 ft.)
> 150 kV to 250 kV	> 4.5 m (15 ft.)	> 2.1 m (7 ft.)	2.1 m to 1.2 m (7 ft. to 4 ft.)	> 4.5 m (15 ft.)	> 3.0 m (10 ft.)	> 2.75 m (9 ft.)
> 250 kV to 550 kV	> 6.0 m (20 ft.)	> 3.7 m (12 ft.)	3.7 m to 2.75 m (12 ft. to 9 ft.)	> 6.0 m (20 ft.)	> 4.6 m (15 ft.)	> 2.75 m (9 ft.)
<b>SYMBOLS</b> ≤ less than or equal to > greater than < less than				cranes, power shovels, back-hoes, mech. brush cutter	RDB, aerial ladder, work platform, uncertified aerial device	certified and tested by <b>certified laboratory</b>

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### For Authorized Workers:

- Only authorized workers or workers under the continuous direction of an authorized worker may approach, work or allow material or conductive tools to approach exposed energized electrical apparatus to limits stated.
- In planning the task to be performed, consideration must be given to the worker's position in relation to the exposed energized apparatus such that movements of the worker's body or conductive tools, material or vegetation will not result in any encroachment upon these limits.
- Authorized workers shall not ascend or descend vegetation that is or has the potential to encroach the restricted zone.



### For Work in the Restricted Zone:

The minimum clearances provided in the restricted zone for authorized workers may only be reduced when authorized workers are performing approved live line procedures, or when approved cover-up (rated for the voltage being worked on) has been applied. The worker and equipment must maintain a minimum distance of 15 cm (6 inches) from the installed, approved barrier(s). Authorized workers or a worker(s) in training under the continuous direction of an authorized worker may approach or allow material or conductive tools to approach exposed energized electrical apparatus as stated in the Restricted Zone section, only when the following conditions are adhered to:

- for all work up to 50 kV, appropriate rubber gloves must be worn while in the Restricted Zone;
- barriers and/or cover-up must be installed where practical to minimize exposure to energized electrical apparatus and all second points of contact;
- a dedicated observer must be in place, who is competent in the task being performed and has no other duties while monitoring the work continuously;
- either the worker performing the work or the dedicated observer must have successfully completed the 4<sup>th</sup> year of a formal Powerline Technician Apprenticeship training program or equivalent; and
- the worker's position in relation to the exposed energized electrical apparatus shall be such that movements of the worker's body or conductive tools, material or vegetation will not result in any encroachment.

### Non-Insulated Booms and Non-Insulated Portion of Aerial Devices:

- Only authorized workers or workers under the continuous direction of an authorized worker are permitted to operate non-insulated booms or noninsulated portion of aerial devices in proximity to exposed energized apparatus.
- Unless otherwise prescribed by an approved work procedure, the distances stated must be strictly followed for all parts of the equipment, including the booms, hoisting cables and any part of the load

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being hoisted. Additional clearance must allow for any change in boom angle, swing of the hoisting cable and load while it is being moved.

- For hoisting and rigging operations in the proximity of energized electrical apparatus, a dedicated signal person must be used.

### **Certified Insulated Aerial Devices:**

- Only authorized workers or workers in training under the continuous direction of an authorized worker are permitted to operate certified insulated aerial devices in proximity to exposed energized apparatus as per the distances specified.

For voltages up to and including 50 kV, approved barriers and/or cover-up must be installed when the minimum clearance stated in this table cannot be maintained.

- For voltages where there are no approved barriers, the stated limits in this table must never be reduced.
- For hoisting and rigging operations in the proximity of energized electrical apparatus, a dedicated signal person must be used.

### **130 Items in Direct Contact with Energized Apparatus**

Unless otherwise prescribed by an approved practice or approved work procedure, workers must not make contact with any pole, structure, vegetation or non insulated vehicle that is in direct contact with apparatus energized at voltages greater than 750 V. Items in direct contact with energized apparatus may only be cleared,

- a) while working from an insulated aerial device and using live line techniques;
- b) using insulated FRP tools from the ground while wearing rubber gloves; or
- c) by de-energizing the electrical apparatus according to the ***Utility Work Protection Code***.

### **131 Painting**



1. Approved work procedures must be in place for painting operations in proximity to energized apparatus.

2. Painting operations must not be carried out where paint spray or a string of paint may reduce the Restricted Limits of Approach to exposed energized apparatus.

3. Painting operations shall not be carried out within the restricted zone.

### **132 Work on or in Proximity to Energized Apparatus**

1. A formal risk assessment shall be conducted and written procedures shall be established and implemented to adequately protect a worker from all electrical shock and burn.

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2. Before performing work on or in proximity to energized apparatus, a review of the written procedure, or if the written procedure is not available, the job steps must be listed directly on the documented job plan and communicated to all workers.

3. Workers shall use protective equipment and barriers adequate to protect them from electrical shock or burn.

### **133 Authorization for Live Line Work**

Live line work shall only be performed by authorized workers, or workers under the continuous direction of an authorized worker, while using approved work procedures.

### **134 Inspection, Testing and Selection of Live Line Tools, Protective Equipment and Aerial Devices**

1. Initial electrical acceptance tests, regular inspections, electrical retesting and maintenance practices must be followed for all FRP live line tools and rubber or fibre/plastic protective equipment. (See Table 1.)

2. Initial electrical acceptance tests and regular electrical retests for rubber gloves, FRP live line tools and rubber or fibre/plastic protective equipment, shall be performed by a testing facility.

3. The expiry date must be clearly shown on the piece of equipment, and it must never be used beyond the expiry date. If the expiry date is not visible, the equipment shall not be used and must be returned for retesting.

4. Pole pruners used in live line applications shall be approved and equipped with an insulated insert in the rope.

5. Motorized non-insulated pole pruners/pole saws shall not be used in proximity to energized apparatus operating at voltages greater than 750 V, and where there is a possibility of contact.

6. All live line tools, rubber gloves and protective equipment must be clean and visually inspected each day, prior to use.

7. When defects, such as cracks, bruises, punctures or other abnormalities, are detected through inspection, the equipment must be removed from service and returned to a testing facility for retesting.

8. Only approved cover-up shall be used on voltages greater than 750 V.



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9. Protective cover-up must not be allowed to remain on energized apparatus longer than absolutely necessary, in order to maintain its dielectric integrity.

### Live Line Tools and Protective Equipment Electrical Retesting Requirements

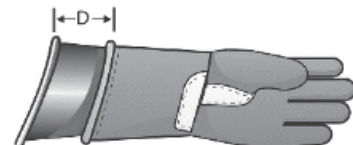
Protective Equipment	Maximum Use Voltage Phase to Phase	Retest Frequency
<b>Rubber Gloves</b>		
Class 00	500 V	90 days
Class 0	1,000 V	90 days
Class 1	7,500 V	90 days
Class 2	17,000 V	90 days
Class 3	26,500 V	90 days
Class 4	36,000 V	90 days
<b>Rubber Blankets, Line Hose, Couplers and Hoods</b>		
Class 0	1,000 V	1 year
Class 1	7,500 V	1 year
Class 2	17,000 V	1 year
Class 3	26,500 V	1 year
Class 4	36,000 V	1 year
<b>Bypass Jumpers/Tubes</b>		
15 kV	15,000 V	1 year
35 kV	35,000 V	1 year
46 kV	46,000 V	1 year
<b>Fibre/Plastic Cover-up</b>		
Class 2	14,600 V	1 year
Class 3	26,500 V	1 year
Class 4	36,600 V	1 year
Class 5	48,300 V	1 year
Class 6	72,500 V	1 year
Insulated Pole Platform	15,000 V	3 years
<b>FRP Live Line Tools</b>		
Hydraulic Pruners/ Pole Saws		1 year
Certified Insulated Aerial Device		1 year
Certified Insulated Aerial Device Barehand	As per the individual unit's current test certification	6 months
Bucket Liner		1 year

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### **Rubber Glove Work**

1. Workers who are required to wear rubber gloves shall be trained in the proper Class selection, and the care and use of rubber gloves and leather protectors.
2. For selection of the appropriate Class of rubber glove, see **Rule 134 “Inspection, Testing and Selection of Live Line Tools, Protective Equipment and Aerial Devices”**.
3. Only rubber gloves that have received initial acceptance tests in accordance with American Standards Testing of Material (ASTM) specifications and sized to fit the worker shall be issued.
4. All rubber gloves shall be marked with a legible expiry date and shall never be used beyond this date.
5. Approved protective covers must be used in conjunction with rubber gloves, and never be used separately as a work glove.
6. Rubber gloves shall,
  - a) be air tested and visually inspected each day, prior to use;
  - b) be exchanged when they become damaged or when the worker to whom they are assigned has reason to doubt their condition;
  - c) be stored away from energized electrical apparatus where ionization or corona may be present;
  - d) be used only with approved protective covers; and
  - e) never be worn inside out.
7. Jewelry must not be worn while wearing rubber gloves.
8. To ensure electrical integrity, the covers must be sized so the minimum cuff distance meets the requirements for each glove Class (see figure below for minimum distances between glove gauntlet and cuff, as required by ASTM).
9. Rubber glove techniques shall be carried out under the establishment of a hold-off where the electrical equipment exists.
10. Rubber gloves shall be worn when,
  - a) controlling poles by using tools and/or ropes in the proximity of energized overhead apparatus;



Distance Between Gauntlet and Cuff (D)		
Class	Inches	Millimetres
00	0.5	13
0	0.5	13
1	1	25
2	2	51
3	3	76
4	4	102

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- b) stringing or sagging conductors in the proximity of energized overhead apparatus;
- c) workers on the ground are guiding materials being raised aloft and distances specified in the “Safe Limits of Approach” for non-insulated booms cannot be maintained.

11. Rubber glove work from 15 kV to 36 kV nominal shall be performed while working from a certified insulated aerial device.

12. When performing overhead rubber glove work, certain jobs present undue difficulty of performance while wearing rubber gloves. In such cases, after measures have been taken using rubber gloves to provide a protected area that will guard against any possibility of inadvertent contact with energized apparatus, at the discretion and with the permission of the worker at the worksite immediately in charge of the work, rubber gloves may be removed and other appropriate hand protection used during the interval of the specific job. Rubber gloves in these cases shall be worn when approaching and leaving the protected area.

### 13. Rest-to-Rest Rule

Rubber gloves of the appropriate voltage rating shall be put on before leaving the rest, and worn continuously while work is carried out on any pole or structure carrying conductors that are energized or could become energized at potentials to 36 kV. The highest voltage on which work is to be performed shall determine the appropriate voltage rating of rubber gloves. In addition, consideration must be given to “**Safe Limits of Approach**” to any higher voltage apparatus.

### IHSA Supplemental

#### 1. Ground-to-Ground Rule



Rubber gloves of the appropriate voltage rating shall be put on before leaving the ground, and worn continuously while work is carried out on any pole or structure carrying conductors that are energized or could become energized at potentials to 36 kV. The highest voltage on which work is to be performed shall determine the appropriate voltage rating of rubber gloves. In addition, consideration must be given to “**Safe Limits of Approach**” to any higher voltage apparatus.

#### 2. Lock-to-Lock Rubber Glove Rule

Rubber gloves of the appropriate voltage rating shall be worn before opening doors or gates, removing covers or panels to enclosures or compartments that will expose energized conductors within falling or reaching distance, and shall be worn continuously while work is being performed in the enclosures or compartments until,

- a) the covers or panels have been replaced and the gates or doors closed and locked; or



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b) the conductors have been de-energized and/or a safe work area established.

**Note: Hands-on work on this equipment energized above 750 V is prohibited.**

### 3. Line Clearing Operations

Workers shall wear the appropriate rubber gloves with leather protectors when the worker or that which is being worked on is within 3 m (10 ft.) of energized apparatus, as follows:

- a) up to 500 V nominal, minimum Class 00;
- b) up to 750 V nominal, minimum Class 0;
- c) up to 5 kV nominal, minimum Class 1;
- d) over 5 kV and up to 50 kV nominal, minimum Class 2.

#### **Ground-to-Ground Rule for *Line Clearing Operations***

- **Authorized workers** may be permitted to ascend/descend vegetation without rubber gloves provided vegetation is outside the restricted zone according to Rule 129 “**Safe Limits of Approach: For Authorized Workers**” and that all climbing equipment, and the climber, can remain outside of proximity while ascending/descending.
- Once aloft appropriately rated gloves must be worn when entering proximity, maintaining safe limits of approach for tools, equipment and authorized worker while removing vegetation.

4. Rubber glove work from 5 kV to 15 kV phase-to-phase shall be carried out while standing on an insulated pole platform or from a certified insulated aerial device.

#### **Hydro One Inc. Supplemental**



1. Rubber gloves shall be worn when,

- a) working on electrical apparatus energized at voltages greater than 300 V nominal;
- b) working within the Restricted Zone to exposed electrical apparatus energized at 750 V nominal or greater (see Rule 129 “Safe Limits of Approach”); or
- c) using live line FRP tools under damp or adverse weather conditions.

2. Rubber glove work on voltages greater than 750 V up to 15 kV nominal shall be performed while working from an insulated pole platform or insulated aerial device.

#### **136 Live Line Tool Work**

1. Live line tool techniques shall be carried out under the direct supervision of a worker authorized to perform the work.

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2. When working on energized lines or equipment using live line tools, at least two authorized workers shall be assigned to do the work.
3. During live line tool work, rubber gloves shall be worn whenever the worker is in the Restricted Zone (**Rule 129 "Safe Limits of Approach"**).
4. Live line tool techniques shall be carried out under the establishment of a hold-off where the electrical equipment exists.
5. When live line tool work is in progress, no other work shall be carried out on the pole, structure or any adjacent structures.

### **137 Barehand Work**

1. Barehand techniques shall only be performed by authorized workers who have received formal training in this method.
2. Barehand work shall only be carried out under the continuous observation of an authorized dedicated observer who has no other duties that would distract from monitoring the work.
3. Barehand work shall only be performed while workers are in a certified, insulated aerial device approved for barehand work or using certified and approved equipment (helicopter).
4. Aerial devices used for barehand work shall be,
  - a) dielectrically tested at least every six months (boom, bucket, jib, etc.); and
  - b) subjected to a metered current leakage test for the voltage to be worked on, immediately prior to commencement of work, and the results recorded.
5. The barehand technique shall be carried out under the establishment of a hold-off where the electrical equipment exists.
6. Bonding leads and clamps shall only be used to establish and maintain grid potential and their combined length shall never exceed the depth of the bucket.
7. Workers shall only contact objects or equipment to which they are bonded.

### **138 Stringing and Removing Conductors**

1. Workers operating stringing equipment shall be either authorized or under the direct supervision of an authorized worker and shall follow approved documented procedures.

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2. Workers involved in stringing or removing conductors shall maintain clear communication at all times.
3. Appropriate measures shall be taken to protect workers and the public in the event of a sudden loss of tension during stringing and sagging operations.
4. When stringing or removing conductors and the possibility of induced voltage or contact with energized apparatus exists, workers shall work in an equipotential zone. Workers working in areas not protected by equipotential grounding and bonding shall wear rubber gloves when handling the conductor.
5. When stringing or removing conductors crossing energized lines, or over roads (public thoroughfares) where the flow of traffic cannot be interrupted, only approved tension stringing techniques, including suitable safeguards at all crossing points, shall be used.

### **Hoists**

1. Web hoists/nylon ratchet tensioners suitable for use on energized conductors shall be cared for as live line tools.
2. Web hoists/nylon ratchet tensioners used on voltages in excess of 750 V phase-to-phase shall be used, in conjunction with link sticks or other approved live line tools, when connected to an anchor point at a different potential than the phase being worked on.
3. Unless otherwise prescribed by an approved work procedure, web hoists/nylon ratchet tensioners shall be used whenever work requiring a hoist is performed within the Restricted Zone to exposed electrical apparatus energized at 750 V nominal or greater (see **Rule 129 "Safe Limits of Approach"**).

### **140 Confined Spaces**

1. All electrical work in confined spaces shall be performed by an authorized worker(s) in accordance with a documented confined space program and appropriate documented work procedure(s) as required by legislation.
2. All confined space entrants shall wear an approved full-body harness at all times. Where no additional hazard is created through its use, a rescue rope or lifeline shall be attached to the harness and its other end to an anchor point or rescue/retrieval device outside of the confined space.
3. Where the system is so designed, switching operations on underground equipment shall be performed outside of the confined space.

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4. Workers, other than those involved in authorized testing and switching, shall not be present in confined spaces when equipment is being energized/deenergized.

### 141 Working on Cables and Associated Equipment

All work where exposed **energized apparatus** exists, a formal risk assessment shall be conducted and written procedures shall be established and implemented to adequately protect a worker from electrical shock and burn.

1. Work on underground cables normally energized in excess of 750 V nominal, unless the cables are de-energized, shall be limited to,
  - a) approved switching and testing procedures while using live line tools; or
  - b) moving energized cables while wearing rubber gloves of the appropriate Class.
2. Entry into enclosures, containing energized apparatus, shall be restricted to those enclosures of adequate size to permit the establishment of a safe work area.
3. Moving energized cables over 750 V shall be carried out with a hold-off in effect where the electrical equipment exists.
4. Energized cables shall be moved only by an authorized worker or a worker under the continual direction of an authorized worker, and with extreme care to avoid damage to cable insulation.
5. Energized cables shall be inspected by an authorized worker prior to moving to ensure the cables and any splices will not create an electrical hazard during the move. If the inspection determines the condition of the cable poses a hazard, the cable must be isolated and de-energized prior to moving.
6. Other than approved switching procedures, no physical pressure shall be applied to a cable or separable connector that may cause any movement, distortion or dislocation of the connector.
7. Underground cables shall be adequately supported to prevent undue stress to the cables during any work activity.
8. When re-energizing spliced cables that have been moved, workers shall remain clear of the immediate work zone.
9. Approved procedures shall be followed to ensure positive identification of cables or apparatus on which work is to be performed.

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10. When spiking underground cables, approved spiking tools shall be used to ensure positive identification. Activation of the spiking tool shall take place from outside the immediate work zone.

### 142 Pulling Cable

1. Cables shall not be pulled into vaults or maintenance chambers containing energized apparatus until a safe work area has been established.

2. Where a possibility exists that a “fish tape” could contact energized apparatus, the fish tape shall be made from non-conductive materials.

3. When pulling cables into a duct already occupied by energized cables, the pulling unit shall be grounded and the operator shall be within an equipotential zone.

### 143 Portable Ladders

Only approved non-conductive portable ladders shall be used when working on or in proximity to energized apparatus.

### 144 Scaffolds

1. Scaffolding must adhere to all requirements prescribed in the current Ontario Occupational Health and Safety Act and Regulations.



2. Scaffolds may be built, moved or used in proximity to energized apparatus only when the minimum clearances for any section or part can be maintained as follows:

a) Clearances for Metal Scaffolding

- i) Vertical clearance shall be at least 0.61 m (2 ft.) plus the distance specified in the appropriate table from **Rule 129 “Safe Limits of Approach”** for authorized workers;
- ii) Horizontal clearance shall be at least 2.5 m (8 ft.) plus the distance specified in the appropriate table from **Rule 129 “Safe Limits of Approach”** for authorized workers;
- iii) **Authorized workers** on a scaffold must maintain a safe distance from all energized apparatus as specified in the appropriate table from **Rule 129 “Safe Limits of Approach”**; and
- iv) Metal scaffolds must be continuously bonded and grounded when used in proximity to exposed energized apparatus.

b) Clearances for Non-Conductive Scaffolding

- i) Authorized workers may build, move or use nonconductive scaffolding up to the limits in **Rule 129 “Safe Limits of Approach”** for authorized workers.

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### 145 Overhead Conductor Insulation

All covered/jacketed/insulated overhead conductors energized at voltages greater than 750 V shall be treated as bare conductors.

### 146 Temporary Power Cables

1. Electrical power **cables** used for temporary service, which are on the ground or exposed to vehicular traffic, must be clearly identified and have barriers installed to prevent accidental contact.
  
2. Temporary power cable installations must be inspected for potential hazards, on a regular basis by a competent worker.

### 147 Cord-Connected Electrical Equipment

Cord-connected electrical equipment shall not be used where the tool and/or cord cannot be secured to prevent its falling or reaching closer than the “**Safe Limits of Approach**” for authorized workers (see **Rule 129**), unless a safe work area has been created through the use of approved barriers.

### 148 Mobile Transformers

Mobile transformers shall be connected and disconnected in accordance with documented policies and procedures.

### 149 Backfeed

1. Before starting work, backfeed hazards must be identified and,
  - a) eliminated where possible; or
  - b) controlled using approved temporary grounding procedures.
  
2. Due to the hazard of backfeed, work is not to be performed on transformers connected in parallel/banked (except for replacing fuses using live line tools) until all sources of electrical energy have been removed from both the secondary and primary sides of the transformer to be worked on.