

GRAVITY

SECTION 4 CHAPTER 23

ELECTRICAL SAFETY (QUALIFIED-HIGH VOLTAGE)

Purpose To establish formal guidelines on high voltage electrical safety for field service personnel working on, or near, equipment with high voltage potential. This procedure has been developed to aid the company in being in compliance with OSHA 29 CFR 1910.269

Scope This procedure applies to all Company jobs and activities, that involve working on, or near equipment with high voltage potential.

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Procedure

Introduction

When considering the hazards that can be presented by electricity, individuals may only think of the potential for electric shock or electrocution.

- Electrical hazards can also cause explosions, burns, projectiles, or pressure waves, from short circuits or arcs in an electric circuit.
- Field Service Personnel must be able to identify unsafe conditions to prevent accidents that involve electricity.
- A worker who is made aware of the worksite hazards is capable of protecting himself/herself and others.

Electrical Hazards

Hazards exist because of unsafe conditions or unsafe acts.

- Unsafe conditions in electrical equipment can be the result of wiring failure, mechanical failure, insulation breakdown, improperly installed equipment, or exposed energized electrical equipment.
- Field Service personnel should consider the following questions before starting any job:
 1. Is the equipment suitable for the task?
 2. Is the equipment mechanically strong and durable?
 3. Is electrical insulation present and sound?
 4. Does heat emit from the equipment at levels that may cause a hazard?
 5. What kind of hazard is presented by arcing in the equipment?
 6. What class of equipment am I about to work on, or near?
 7. Are there any other hazards with the equipment that can affect other employees and equipment?
- Unsafe acts are usually the result of improper training or negligence.
- Unsafe acts include working in an unsafe manner, such as working on energized equipment with improper tools, or working near energized and exposed equipment, without first determining if the work task is safe.
- Electrical work may involve other safety hazards that are not directly related to high voltage.

- These hazards include:
 1. Work conducted around other types of energized systems.

Work on or Near Energized Electrical Equipment

- Energized electrical equipment must be de-energized before Field Service Personnel work on or near them. (x-ref Lockout/Tagout)
- Only qualified persons may work on electrical equipment or circuits that have not been de-energized, as described in the Lockout/Tagout procedure.
- An exception to this requirement is the testing of electrical circuits that can only be performed with the circuit energized.
- The lockout/tagout procedure also does not apply under the following conditions:
 1. Servicing or maintenance of machines or equipment during normal production operations unless employees are required to remove or bypass a guard, or must place their body into a danger zone associated with the machine or equipment operating cycle, or come in contact with the point of operation of the operational machine or equipment.
 2. Work on the cord and plug connected to the electrical equipment for which exposure to the hazards of unexpected energization or start-up of the equipment is controlled by the unplugging of the equipment from the energy source, and by the plug being under the exclusive control of the employee performing the servicing or



maintenance.

**Guidelines for
Lockout/Tagout
of De-energized
Equipment**

- When Field Service Personnel are exposed to contact with any part of electrical equipment or circuits that have been de-energized, the energized parts shall be locked out (or tagged if a lockout device cannot be physically attached) in the following order:
 1. Procedures or a plan of action for safely de-energizing the equipment must be developed.
 2. The electrical equipment or circuits to be worked on must be disconnected from all energy sources.
 3. Control circuit devices such as push buttons, selector switches, and interlocks cannot be the sole means of de-energization.
 4. Stored electrical energy must be released.
 5. Stored non-electrical energy in devices that could reenergize electric circuit parts must be blocked or relieved.
 6. A lock and an ID tag (containing a statement prohibiting unauthorized operation of the disconnecting means and removal of the tag) must be placed on each disconnecting means, used to de-energize the electrical equipment or circuits on which work is to be performed.
 7. A tag used without a lock must be supplemented by at

least one additional safety measure, that provides a level of safety equivalent to that obtained by the use of a lock.

8. Examples include:

- a. Removal of an isolating circuit element
- b. Blocking of a controlling switch
- c. Opening of an extra disconnecting device

9. A lock may be placed without a tag only under the following conditions:

- a. Only one piece of electrical equipment or circuit
 - b. is deenergized.
 - c. The lockout period does not extend beyond the
 - d. workshift.
 - e. Field Service Personnel exposed to the hazards
 - f. associated with reenergizing the electrical
 - g. equipment or circuit are familiar with this
 - h. procedure.
- Prior to performing any work on electrical equipment or circuits considered to be de-energized, Field Service Personnel must:
 1. Verify that the equipment cannot be restarted by operating the controls.
 2. Verify with appropriate test equipment that circuit

elements and electrical parts of the equipment are de-energized.

3. Verify that there are not any energized conditions that exist as a result of inadvertently induced or unrelated voltage backfeed.

Re-energizing Equipment

- Before any electrical equipment or circuit can be reenergized (even on a temporary basis), the following steps must be performed in order:
 - a. Field Service Personnel must conduct tests and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds, and other such devices have been removed.
 - b. Field Service Personnel must warn employees exposed to the hazards associated with reenergizing the electrical equipment or circuits that they should remain clear of.
 - c. Each lock and tag must be removed by the employee who applied it, or under his, or her, direct supervision.
 - In the event the employee who initially applied the lock or tag is not at the workplace, then they can be removed by a designated person after it has been verified that the affected employee is not at the worksite, and that he or she is notified before resuming work in the area.
 - d. Visual determination by the Field Service Personnel that all employees are indeed out of the area.

Work on or Near Energized

There are safety considerations and clearance distances applicable to vehicular or mechanical equipment, such as a man-lift, that apply

Overhead Lines when working near overhead lines.

- a. Since this equipment may become energized down to the ground level, all overhead distance restrictions apply at the ground level as well.
- b. Warning signs should be used to keep people away from any vehicle operating near overhead lines.
- c. Unqualified persons working near exposed energized overhead lines with voltages less than 50,000 volts, must come no closer than 10 feet (3 meters) to the lines.
 - No object that an unqualified person carries must come any closer than this distance.
 - This distance limit increases by 4 inches (10.2 cm) for every 10,000 volts over 50,000 volts.
- d. Qualified persons working near exposed energized overhead lines

may not approach, or take any object without an approved insulating handle, and get no closer to exposed energized parts than shown in the table below:

**APPROACH DISTANCE
FOR QUALIFIED EMPLOYEES
(ALTERNATING CURRENT - A/C)**

Voltage Range (Phase to Phase) Minimum Approach Distance

Over 121kV, but not over 140kV 4 ft. 6in. (137 cm)

Over 87.5kV, but not over 121kV 4 ft. 0in. (122 cm)

Over 37kV, but not over 87.5kV 3 ft. 6in. (107 cm)

Over 15kV, but not over 37kV 3 ft. 0in. (91 cm)

Over 2kV, but not over 15kV 2 ft. 0in. (61 cm)

Over 750V, but not over 2kV 1 ft. 6in. (46 cm)

Over 300V, but not over 750V 1 ft 0in. (30.5 cm)

300V and less Avoid Contact

e. It is acceptable for a qualified person to come closer to the above

voltages under the following conditions:

- The person is wearing insulated gloves with the proper voltage rating.
- The energized part is insulated.
- The person is insulated from all conductive objects (for example, by an insulated mat with the proper voltage rating).

**Safe Electrical
Work Practices**

Field Service Personnel must adhere to the following safe work practices when working around energized parts:

a. Exposed circuits

1. Treat all exposed circuits as live and dangerous until proven otherwise.

b. Alertness (NFPA 70E)

1. Ill, fatigued, or otherwise impaired, employees should not stay on the job.
2. Stop all work if you are distracted by an unrelated activity.

c. Illumination

1. Do not:
 - Enter any area of exposed, energized parts, unless adequate illumination is provided to work safely.
 - Do not reach blindly into areas that may contain energized parts.

d. Conductive Apparel

1. Do not wear conductive apparel such as:
 - Jewelry
 - Watch bands
 - Bracelets
 - Rings
-

- Key chains
- Necklaces
- Metalized aprons
- Cloth with conductive thread
- Metal headgear.

e. Conductive Materials and Equipment

1. When conductive materials and equipment are being held by an employee, they must not be handled in a way that will cause them to come in contact with exposed or energized parts.

2. Examples of these materials and equipment are:

- Ducts
- Pipes
- Tubes
- Conductive hose
- Conductive rope
- Metal rules
- Metal scales
- Steel tapes
- Chains

f. Inadvertent contact

1. Do not use a screw driver without an insulated handle and shank around energized equipment.
2. Avoid carrying conduit, piping, or tubing in a vertical position, around energized equipment.

g. Insulated Tools and Equipment

1. The use of insulated tools are required when working with energized or exposed parts.
2. The voltage present must not exceed the rated voltage of the tool in use.

h. Portable Ladders

1. Do not use metal ladders near exposed energized parts.

i. Confined or Enclosed Work Spaces

1. A confined space is any space with a restricted means of entry and regress, or a space where natural ventilation through openings does not prevent dangerous gasses or vapors from accumulating.
2. Examples include a manhole or a vault.
3. Do not enter a confined or enclosed space that contains exposed energized parts unless qualified to do so. (x-ref confined space Entry).

j. Housekeeping and Janitorial Duties

1. Do not:
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- Perform housekeeping duties near live exposed parts.
- Use solvents around exposed energized equipment. The vapors may conduct across the phases or to ground.

k. Interlocks

1. Only a qualified person can defeat an electrical safety interlock.
 2. This work must be performed in accordance with work practices.
 3. Disconnecting interlocks is only allowed temporarily while an employee is working on the equipment.
 4. The interlock system must be returned to an operable condition, when this work is completed and it is safe to do so.
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Training Requirements

Field Service Personnel will be trained on the following topics:

- a. Distinguishing exposed live parts from other parts of electric equipment.
 - b. Determining nominal voltages of exposed live parts.
 - c. Safe clearance distances.
 - d. Safe work habits for energized equipment and circuits.
 - e. Special precautionary techniques.
 - f. Personal protective equipment.
 - g. Insulating and shielding materials and tools.
 - h. Contents of this procedure.
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Training Frequency

Field Service Personnel will be trained according to the following schedule:

- a. Initially upon hire.
 - b. Every 36 months.
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Definitions

High Voltage, as referenced in this procedure, is voltage equal to 480 volts and above.

Qualified person is an individual who has been trained in avoiding the electrical hazards of working on or near exposed energized parts.

- a. Field Service Personnel who have received the training



mandated

in this procedure are considered qualified persons.

Unqualified person is an individual who has little or no electrical safety training.

a. Field Service Personnel who have not received the training

mandated in this procedure are considered unqualified persons.



Purpose This document describes the policy on horseplay.



Policy Horseplay, such as wrestling, practical jokes, hazing, etc., is prohibited while in course and scope and may result in disciplinary action up to and including termination.



Housekeeping

Purpose This document describes the policy on housekeeping.

Policy Maintain work areas in a neat and orderly manner.

Clean up trash and all spills as soon as possible.

Keep the following areas clean and orderly at all times:

stairs

emergency exits

walkways

vehicles and equipment

facilities

offices

Pinch Points

Purpose

This document:

- defines pinch points
- describes hazards pinch points pose
- describes ways to avoid injury

Defining pinch points

A pinch point is a confined area where any part of the body may be:

- mashed
- squeezed
- twisted
- severed

Many injuries result from body parts being caught in these equipment areas.

Avoiding pinch points

This table outlines steps to take when performing common activities.

IF you are...	THEN...
raising OR lowering loads by hand,	<ol style="list-style-type: none"> 1. Check your surroundings before you begin. 2. Use the proper number of people. 3. Follow proper lifting procedures.
carrying items in closed quarters,	avoid all pinch zones
raising or lowering equipment,	avoid all pinch zones
connecting or disconnecting:	follow proper procedures noted in

<ul style="list-style-type: none">• wire rope cables• lines• slings• shackles• rigging material,	<p><i>“Working with Rigging Materials”</i> of this manual</p>
<p>using the rig hoisting system,</p>	<p>avoid all moving parts of equipment</p>

Avoiding pinch points when using equipment

Avoid pinch points when using the following equipment:

- lifting equipment
 - rotary rig hoisting system and elevators
 - pulleys, lines, and cables
 - slings
 - tongs
- hardware
 - valves
 - handles
 - drums
 - slips
- entryway equipment
 - doors
 - hinges, locks, and hatches
 - covers and lids
- miscellaneous equipment
 - gears and belts
 - chains and chain drives
 - cathead
 - wire rope
 - tools
 - power
 - hand
 - machine



- motor-driven equipment
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