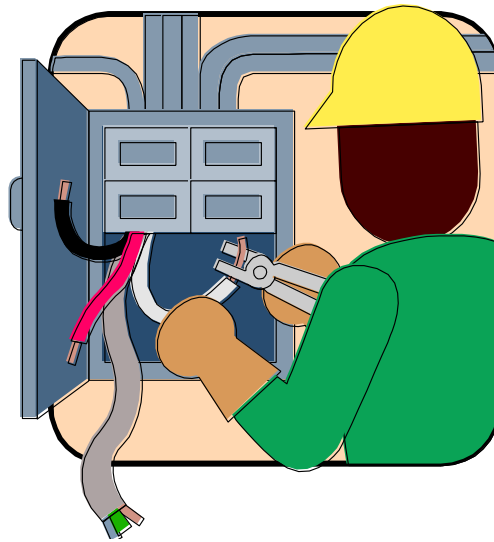


CITY OF NEWPORT NEWS ELECTRICAL SAFETY PROGRAM



OSHA 1910.331-335

Safety Related Work Practices

Electrical Safety Program

I. PURPOSE

This program establishes requirements for preventing electric shock or other injuries resulting from direct/indirect electrical contacts to employees working on or near electrical equipment and circuit parts operating at or above 50 volts.

II. SCOPE

This program applies to all work operations in the City of Newport News where employees may be exposed to energized electrical equipment or circuit parts operating at or above 50 volts.

In addition, employees working around, but not on, electrical equipment operating at 50 volts or higher and have the potential to be exposed to an electrical hazard must be trained in the inherent danger of electricity.

III. REFERENCE

Occupational Safety & Health Administration (OSHA) for General Industry CFR 1910.331-335, Subpart S - Electrical Safety-Related Work Practices. CFR 1910.147, Control of Hazardous Energy Source (Lockout/Tagout) Standard and CFR 1910.146, Confined Space Standard.

IV. DEFINITION

- **Affected Person** – a person whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.
- **Authorized Person** – a person who locks out or tag out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance.
- **De-energized** – all stored or residual energy source has been blocked or cut off and tested for the absence of voltage by approved means.
- **Energized** – connected to an energy source or potentially containing residual or stored energy.
- **Energy Isolating Device** – a mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or

isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

- **Energy Source** – any source of electrical voltage/power.
- **Lockout** – the placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
- **Lockout Device** – a device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
- **Qualified Person** – one familiar with the construction and operations of the equipment and the hazards involved.
- **Tagout** – the placement of a tagout device on an energy-isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
- **Tagout Device** – a prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
- **Unqualified Person** – one not familiar with the construction and operations of the equipment and hazards involved.
- **Voltage, nominal** – a nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (as 120/240, 480Y/277, 600, etc). The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

V. RESPONSIBILITIES

The Safety Program Administrator will review this program annually and make updates and changes when necessary.

VI. APPLICATION

A. Work practices covered by this program include persons working on, near or with:

- **Premises wiring** – installations of electric conductors and equipment within or on buildings or other structures, and in other areas such as yards, parking and other lots.
- **Wiring for connection to supply** – installations of conductors that connect to the supply of electricity.
- **Other wiring** – installation of other outside conductors on the premises.

- **Optical fiber cable** – installation of optical fiber cable made along with electric conductors.
- B. Work practices covered by this program include work performed by unqualified persons on, near or with:
- Electric power generation, transmission and distribution installations
 - Communications installations
 - Installations in vehicles and
 - Railway installations
- C. This program **does not** apply to work performed by qualified persons on or directly associated with:
- Generation, transmission and distribution installations for the generation, control, transformation, transmission, and distribution of electric energy (including communication and metering) located in buildings used for such purposes or located outdoors.
 - Work or equipment that uses electric power is covered by these safety related work practices if this equipment is not an integral part of an electric generating installation.
 - Work on or directly with generation, transmission, or distribution installations, including:
 - Repairing overhead or underground distribution lines or repairing a feed water pump for a boiler
 - Line clearance tree trimming and pole replacement; and
 - Work on electric utilization circuits in a generating plant provided that
 - Circuits are commingled with installation of power generation equipment or their circuits and
 - Generation equipment and their circuits present greater electrical hazard than those posed by the utilization equipment of circuits (exposed to higher voltage or lack of over current protection).
- D. Electrical installations in vehicles such as ships, watercraft, or automotive vehicles other than mobile homes and recreational vehicles.

VII. TRAINING

- A. Employees facing a risk of electrical shock that is not reduced to a safe level by proper electrical installation per the National Electrical Code and OSHA standards shall be trained per the requirements of this program.

B. Employees in the following occupations must be trained:

- Blue collar supervisors
- Electrical and electronic engineers
- Electrical and electronic equipment assemblers
- Electrical and electronic technicians
- Electricians
- Industrial machine operators
- Material handling equipment operators
- Mechanics and repairers
- Painters
- Riggers and roustabouts
- Stationary engineers
- Welders
- Any other employee who would be expected to face a similar risk of injury due to electric shock or other electrical hazards.

C. Employees in these groups do not require training if their work, or the work of those they supervise, does not bring them close enough to exposed parts of electric circuits operating at 50 volts or more to ground for a hazard to exist.

VIII. CONTENTS OF TRAINING

A. Employees shall be trained concerning the requirements of this program, and shall be made familiar with the safety-related work practices that pertain to their job assignments.

B. Unqualified employees facing a risk of electric shock shall be trained in and familiar with any electrical related safety practices not covered by this program or OSHA standards but which are necessary for their safety.

C. Those qualified persons permitted to work on or near exposed energized parts shall receive minimum training in and shall be familiar with the following:

- The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
- The skills and techniques necessary to determine the nominal voltage of exposed live parts, and
- The clearance distances specified for working on or near exposed energized parts and the corresponding voltage to which the qualified person will be exposed.

- D. Qualified persons whose work on energized equipment involves either direct contact, or contact by means of tools or materials, shall also receive training on how to work safely on energized circuits. These employees shall be familiar with proper precautionary work practices, personal protective equipment, insulating and shielding materials, and the use of insulated tools.
- E. The training for qualified and unqualified employees will involve classroom and on-the-job training. The degree of training provided will be determined by the risk to the employee and potential exposure conditions that the employee may face during their work.
- F. Departmental personnel shall be trained by departmental supervision with assistance as necessary from the Safety Program Administrator.
 - Training shall be performed before the employee is assigned duties involving work around or on electrical systems.
 - Retraining will be performed annually and whenever work site inspections indicate that an employee does not have the necessary knowledge or skills to safely work in or around electrical systems.
 - The departmental training coordinator or designee will maintain training records.
 - Training records shall include the date(s) of the training program, the instructor(s) of the training program, a copy of the written material presented, and the names of the employee(s) to who the training was given. (See Appendix A - Training Form)

IX. SELECTION AND USE OF WORK PRACTICES

- A. Approved work practices will be used by the employee to prevent electric shock or other injuries that could result from either direct or indirect electrical contact.
- B. Those work practices will be used when work is performed near or on equipment or circuits that are or may be energized.
- C. The work practices used will be consistent with the nature and extent of the electrical hazard.
- D. De-energized parts:
 - Live parts to which an employee may be exposed will be de-energized before the employee works on or near them, unless:

- It is demonstrated that de-energizing introduces additional or increased hazards or is not possible due to equipment design or operational limitations; or
- Live parts operate at less than 50 volts to ground and there is no increased exposure to electrical burns or to explosion due to electric arcs.
- Examples of “additional or increased” hazards include interruption of life support equipment, deactivation of emergency alarm systems, and shutdown of hazardous location ventilation equipment.

E. Energized parts:

- If de-energizing exposed live parts add to or increase the hazard, then other approved work practices will be used to protect employees who may be exposed to electrical hazards involved.
- The work practices used must protect employees from contact with energized circuit parts directly with any part of their body or indirectly through some other conductive object.
- The work practices used must be suitable for the conditions under which the work is performed and for the voltages of exposed electric conductors or circuit parts.

F. Working On Or Near Exposed De-Energized Parts

- Only qualified persons are allowed to work on electric parts or equipment that have not been de-energized using approved lockout/tagout procedures.
- When employees work on exposed de-energized parts or near enough to them to expose the employee to an electrical hazard, then the following safety-related work practices will be followed:
 - Any conductors or parts of electric equipment that have not been properly locked or tagged will be treated as energized even if these systems have been de-energized.
 - If the potential exists for an employee to contact parts of fixed electric equipment or circuits that have been de-energized, the circuits energizing the parts shall be locked out or tagged out or both.
 - Locking and tagging procedures shall comply with the City of Newport News Lockout/Tagout Program and the requirements of Section VII of this program.

X. WORK PRACTICES AND PROCEDURES:

- A. Circuit parts that cannot be de-energized using the procedures that follow shall be treated as energized regardless of whether the parts are, in fact de-energized. The following procedures shall be used to de-energize and lock and/or tag out the energy source.
- De-energizing Equipment:
 - Safe procedures for de-energizing circuits and equipment will be determined by the worker before circuits or equipment are de-energized.
 - Circuits and equipment to be worked on will be disconnected by the worker from all electric energy sources. Control circuit devices, such as push buttons, selector switches, and interlocks will not be used as the sole means for de-energizing circuits or equipment. Interlocks for electric equipment may not be used as a substitute for lockout and tagging procedures.
 - Stored electrical energy that might endanger personnel must be released prior to the work. This might include, discharging capacitors, and short-circuiting and grounding high capacitance elements. If the capacitors or associated equipment are handled during this work, they must be treated as energized.
 - Stored non-electrical energy (for example, hydraulic or pneumatic) in devices that could be blocked or relieved so that circuit parts cannot be accidentally re-energized by the device.
 - Application of locks and tags
 - A lock and tag shall be placed on each disconnecting means used to de-energize circuits and equipment on which work is to be done. The lock shall be attached so as to prevent persons from re-energizing the circuits unless they resort to undue force or the use of tools. The tagging procedure detailed below shall be followed when a lock cannot be applied.
 - Tags may be used without a lock only when a lock cannot be applied, or where it has been demonstrated that tagging procedures provide a level of safety equal to a lock.
 - When a tag is used without a lock, the tag shall be supplemented by at least one additional safety measure. This safety measure shall provide a level of safety equivalent to that obtained by the use of a lock. Additional

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safety measures include, for example, removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device.

- Each tag shall contain a statement prohibiting unauthorized operation of the disconnecting means and removal of the tag.
- Locks may be used without tags only under the following conditions:
 - Only one circuit or piece of equipment is de-energized;
 - The lockout period does not extend beyond the work shift; and
 - Employees exposed to the hazards associated with re-energizing the circuit or equipment must be familiar with this procedure.

B. Verification of De-energized Condition

- The following requirements must be met before any circuit or equipment is considered de-energized or may be worked on as de-energized.
 - A qualified person shall activate the equipment operating controls or use other methods to verify that the equipment cannot be restarted.
 - A qualified person shall use test equipment to ensure that electrical parts and circuit elements are de-energized. The test shall confirm there is no energized condition from induced voltage or voltage back feed.
 - Test equipment and instruments shall be visually inspected for external defects or damage before being used to verify that the equipment or circuit is de-energized.
 - When the voltage over 600 volts nominal are tested, the test equipment shall be checked for proper operation immediately before and after the test.

C. Re-Energizing Equipment

- The following requirements shall be met, in the order given, before circuits or equipment are re-energized, even temporarily;
 - A qualified person shall conduct tests and visual inspections as necessary to verify that all tools, electrical jumper, shorts, grounds and other such devices have been removed, so that circuits and equipment can be safely energized;

- Employees potentially exposed to the hazards of re-energizing the circuit shall be warned to stay clear; and
- Each lock and tag shall be removed by the person who applied it. However, if the person is absent from the workplace his or her lock and tag may be removed by a qualified person designated by their supervisor or perform the task provided that:
 - The supervisor ensures that the person is not present at the workplace;
 - The supervisor ensures that the person is informed at the first opportunity that his or her lock and tag has been removed before he or she resumes work at that workplace; and
 - The supervisor makes a visual determination to ensure that all employees are clear of the circuits and equipment prior to lock and/or tag removal.

XI. WORKING ON/NEAR EXPOSED ENERGIZED PARTS

- A. Employees are considered to be working on or near exposed energized parts when working on exposed live parts by direct contact, contact by means of tools or materials, or when working close enough to energized parts for a hazard to exist as shown by Table S-1 in this program.
- B. Energized Equipment
 - Only qualified persons are permitted to work on electric circuit parts or equipment operating at 50 volts or higher.
 - Qualified personnel shall have received training on and must be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools.
- C. Overhead Power Lines
 - When work is to be performed near overhead lines, the lines shall be de-energized and grounded. If this is not possible, then other protective measures shall be taken before the work is started.
 - Arrangements shall be made with the person or organization that operates or controls the electric circuits when lines are to be de-energized and grounded.

- Protective measures used (i.e., guarding, isolating, or insulating) shall prevent direct contact by the qualified person or indirect contact through conductive materials, tools, or equipment. Only qualified persons of power transmission and distribution organizations are allowed to install insulating devices on overhead power transmission and distribution lines.
- Unqualified persons, and conductive objects used by these employees, may not approach closer than the minimum distance specified in Table S-1 when working in an elevated location near unguarded, energized overhead lines.
- Unqualified persons working on the ground are not allowed to bring any conductive object or any insulated object that does not have the proper insulating rating closer to unguarded, energized overhead lines than the distance allowed in Table S-1.

TABLE S-1

Voltage to Ground	Minimum Approach Distance
50 kV or less	10 feet
Over 50 kV	10 feet + 4 inches for every 10 kV over 50 kV

- Qualified persons working in the vicinity of overhead lines, whether in an elevated position or on the ground, are not allowed to approach or take any conductive object without an approved insulating handle closer to exposed energized parts than allowed in Table S-2 unless:
 - The person is insulated from the energized part by using gloves, with sleeves if necessary, rated for the voltage involved; or
 - The energized part is insulated from all other objects at a different potential and from the person; or
 - The person is insulated from all conductive objects at a potential different from the energized part.

TABLE S-2

APPROACH DISTANCES FOR QUALIFIED PERSONS EXPOSED TO ALTERNATING CURRENT	
Voltage Range (phase to phase)	Minimum Approach Distance
300 V and less	Avoid Contact
Over 300V, not over 750V	1 ft. 0 in.

Over 750V, not over 2kV	1 ft. 6 in.
Over 2kV, no over 15 kV	2 ft. 0 in.
Over 15kV, not over 37 kV	3 ft. 0 in.
Over 37 kV, not over 87.5 kV	3 ft. 6 in.
Over 87.5 kV, not over 121 kV	4 ft. 0 in.
Over 121 kV, not over 140 kV	4 ft. 6 in.

XII. VEHICULAR AND MECHANICAL EQUIPMENT

- A minimum clearance of 10 feet shall be maintained between energized overhead lines and all vehicles or mechanical equipment capable of having parts or its structure elevated (e.g., cranes, mobile scaffolds, elevating platforms, dump trucks, lift trucks and flatbed trailer cranes).
- If the voltage of the overhead line is greater than 50 kV, the clearance shall be increased by 4 inches for every 10 kV over 50 kV.
- The above clearances may be reduced if:
 - The vehicle is in transit with its structure lowered. The clearance may be reduced to 4 ft. when near energized lines operating at less than 50 kV, or 4 ft. plus 4 inches for every 10 kV over 50 kV.
 - Insulating barriers are installed to prevent contact with the lines and the barriers are rated for the voltage of the line being guarded.
 - The barrier may not be part of any attachment to the vehicle or its raised structure.
 - The clearance may be reduced to the distance allowed by the design of the insulating barrier.
 - The equipment is an aerial lift insulated from the voltage involved and a qualified person performs the work.
 - The clearance between the un-insulated portion of the lift and the power lines may be reduced to the distance given in Table S-2.
- Persons working on the ground are not allowed to contact the vehicle or mechanical equipment or any of its attachments, unless;
 - The person uses protective equipment rated for the voltage; or
 - The equipment is located so that no un-insulated part of its structure can provide a conductive path to persons on the ground.

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- Equipment shall not approach closer to the line than 10 feet for voltages less than 50 kV, or 10 feet plus 4 inches for every 10 kV over 50 kV.
- When any vehicle or mechanical equipment is intentionally grounded, persons may not stand near the point of grounding when there is any possibility of contact overhead energized lines.
- Additional precautions (e.g., such as the use of barricades or insulation) shall be taken as necessary to protect persons from hazardous ground potentials that can develop within a few feet or more outward from the ground point.

XIII. ILLUMINATION

- A. Persons may not enter spaces containing exposed energized parts unless illumination is provided that enables the persons to perform the work safely.
- B. Persons may not perform tasks near exposed energized parts where there is lack of illumination or an obstruction that hinders observation of work to be performed. Employees shall not reach blindly into areas that may contain energized parts.

XIV. CONFINED OR ENCLOSED WORK SPACES

- A. Persons working in confined or enclosed spaces such as manholes or vaults that contain exposed energized parts shall be provided with and must use as necessary protective shields, protective barriers, or insulating materials to prevent inadvertent contact with these parts.
- B. The employee shall secure doors and hinged panels to prevent their swinging into a person, and causing the person to contact exposed energized parts.
- C. Work within a confined space that has the potential to generate an airborne hazard (e.g., use of solvents, painting, welding and so forth), or entry into a permit-required confined space must comply with the City of Newport News Confined Space Entry Program.

XV. CONDUCTIVE MATERIALS AND EQUIPMENT

- A. Conductive materials and equipment that are in contact with any part of a person's body shall be handled in a manner that will prevent them from contacting exposed energized conductors or circuit parts.
- B. If a person must handle long dimensional conductive objects (such as metal ducts, pipes, and rods etc.) in areas with exposed live parts, then work practices such as the

use of insulation, guarding and materials handling techniques will be used which will minimize the hazard.

XVI. PORTABLE LADDERS

- A. All portable ladders used shall have non-conductive side rails if they are used where the potential for contact with exposed energized parts exists.

XVII. CONDUCTIVE APPAREL

- A. Employees shall not wear conductive articles of jewelry and clothing such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear if they might contact exposed energized parts. However, such articles may be worn if they are rendered non-conductive by covering, wrapping or other insulating means.

XVIII. HOUSEKEEPING

- A. Housekeeping duties shall not be performed close enough for contact with live parts to occur unless adequate safeguards, such as insulating equipment or barriers, are provided.
- B. Electrically conductive cleaning materials, including conductive solids such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions, will not be used near energized parts unless procedures are followed which prevent electrical contact.

XIX. INTERLOCKS

- A. Only qualified persons are allowed to bypass an electrical safety interlock, and then only temporarily while he or she is working on the equipment. This work shall comply with the specified procedures for working on or near exposed energized parts. The interlock system shall be returned to its operable condition when the work is completed.

XX. USE OF EQUIPMENT

- A. This section applies to the use of cord-and-plug connected equipment, including flexible cord sets such as extension cords.
 - Handling
 - Portable equipment shall not be handled in a manner that will cause damage.

- Flexible electric cords connected to equipment shall not be used for raising or lowering equipment.
- Flexible cords may not be fastened with staples or otherwise hung in a manner that could damage the outer jacket or insulation.

B. Visual Inspection

- Portable cord-and-plug connected equipment and flexible cord sets (extension cords) shall be visually inspected for external defects before use on every shift. These defects include loose parts, deformed and missing pins, or damage to the outer jacket or insulation and/or possible internal damage, such as a pinched or crushed outer jacket.
- Cord-and-Plug connected equipment and flexible cords that remain connected once they are put in place and are not exposed to damage need not be visually re-inspected until they are relocated.
- When defects or evidence of damage, which might expose employees to injury, are detected, the defective or damaged item shall be removed from service. No employee shall use the damaged or defective item until it has been repaired and tested to ensure that it is safe to use.
- Prior to connecting an attachment to a receptacle, ensure the plug and receptacle contact mate properly.

C. Grounding-type Equipment

- Flexible cords used with grounding-type equipment must contain an equipment-grounding conductor.
- Attachment plugs and receptacles may not be connected or altered in a manner that prevents proper continuity of the ground at the point where plugs are attached to receptacles.
- Plugs and receptacle may not be altered to allow the grounding pole to be inserted into current connector slots.
- Adapters that interrupt the continuity of the equipment grounding connection may not be used.

XXI. CONDUCTIVE WORK LOCATIONS

- A. All portable electric equipment and flexible cords used in highly conductive work locations, such as those with water or other conductive liquids present, or in places

where employees are likely to contact water or conductive liquids, shall be approved for use in those locations.

XXII. CONNECTING ATTACHMENT PLUGS

- A. Employees' hands must not be wet when plugging and unplugging flexible cords and cord-and-plug connected equipment if energized equipment is involved.
- B. If cord connectors are wet from being immersed in water or the condition of the connection could provide a conducting path to employees' hands, the energized plug and receptacle connections may be handled only with insulating protective equipment.
- C. Locking-type connectors shall be properly secured after connection.

XXIII. ELECTRIC POWER AND LIGHTING CIRCUITS

- A. Routine Opening and Closing of Circuits
 - Only load rated switches, circuit breakers, or other devices specifically designed as disconnecting means may be used for opening, reversing, or closing circuits under load conditions. Cable connectors not of the load-break type, fuses, terminal lugs, and cable splice connections may not be used for opening, reversing, or closing circuits under load conditions except in an emergency.
- B. Re-closing Circuits after Protective Device Operations
 - After a circuit is de-energized by a circuit protective device, the circuit may not be manually re-energized until it has been determined that the equipment and circuit can be safely energized. Repetitive manual closing of circuit breakers or re-energizing circuits through replaced fuses is prohibited. When it can be determined from the design of the circuit and the over current device involved, however, that the automatic operation of a device was caused by an overload rather than a fault condition, no examination of the circuit or connected equipment is needed before re-energizing the circuit.
- C. Over-current Protective Modification
 - Over-current protection of circuits and conductors may not be modified, even on a temporary bases, beyond that allowed by OSHA 1910.304(e), the installation safety requirements for over-current protection.

XXIV. TEST EQUIPMENT AND INSTRUMENTS

- A. Only qualified persons are allowed to perform testing work on electric circuits or equipment.

- B. All test instruments and equipment and all associated test leads, cables, power cords, and the employee shall visually inspect probes for external defects and damage before the equipment is used.
- C. If defects or damage is observed that might expose an employee to injury, the items shall be removed from service and may not be used until repaired and tested to ensure that the equipment is safe.
- D. Test instruments and equipment and their accessories shall be rated for the circuits and equipment to which they will be connected, and shall be designed for the environment in which they will be used.

XXV. OCCASIONAL USE OF FLAMMABLE OR IGNITABLE MATERIALS

- A. Where flammable materials are present only occasionally, electric equipment capable of igniting the flammable materials may not be used unless appropriate measures are taken to prevent hazardous conditions from developing (e.g., by complying with the City of Newport News Hot Work Permit Program).
- B. Flammable materials include, but are not limited to: flammable gases, vapors, or liquids; combustible dust; and ignitable fibers.

XXVI. SAFEGUARD FOR PERSONAL PROTECTION

- A. Use of Personal Protective Equipment
 - Employees working in areas where there are potential electrical hazards shall be provided with and shall use electrical protective equipment appropriate for the parts of the body to be protected and the work to be performed. The employee's department shall provide electrical safety-related personal protective equipment required by this section.
 - Protective equipment shall be maintained in a safe, reliable condition and shall be periodically inspected by the employee or tested as required by OSHA 1910.137, Electrical Protective Devices.
 - Where the insulating capability of protective equipment is subject to damage during use, an outer covering of leather or other appropriate material shall protect the insulating material.
 - Non-conductive head protection shall be worn wherever there is danger of head injury from electrical shock or burns due to contact with exposed energized parts.

- Protective equipment for the eyes or face shall be worn where there is danger of eye and/or face injury from electric arcs or flashes or from flying objects resulting from electrical explosions.

XXVII. GENERAL PROTECTIVE EQUIPMENT AND TOOLS

- A. Insulated tools or handling equipment shall be used by employees working near exposed energized conductors or circuit parts if the tools and/or equipment may make contact with the conductors or parts. The insulating material of tools and equipment shall be protected if it is subject to damage.
- B. Fuse handling equipment, insulated from the circuit voltage, shall be used to remove or install fuses when the fuse terminals are energized.
- C. All ropes and hand lines used near exposed energized parts shall be non-conductive.
- D. Protective shields, protective barriers, or insulating materials shall be used to protect employees from shock, burns, or other electrically related injuries while employees are working near exposed energized parts that might be accidentally contacted or where dangerous electric heating or arcing might occur.
- E. When normally enclosed live parts are exposed for maintenance or repair, the parts shall be guarded to protect unqualified persons from contact with the live parts.

XXVIII. ALERTING TECHNIQUES

- A. The following alerting techniques shall be used to warn and protect employees from electrical shock hazards, burns, or failure of electric equipment parts.
 - Safety Signs and Tags
 - Safety signs, safety symbols, or accident prevention tags will be used where necessary by employees to warn other employees about electrical hazards that may endanger them.
 - Signs, symbols or accident prevention tags shall meet the requirements of OSHA 29 CFR 1910.145, Specifications for Accident Prevention Signs and Tags. Information regarding proper signage may be obtained by contacting the Office of Self Insurance.
 - Barricades
 - Barricades shall be used in conjunction with safety signs where necessary to prevent or limit employee access to work areas exposing employees to un-insulated energized conductors or circuit parts.

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Conductive barricades may not be used where they might cause an electrical contact hazard.

- Attendants
 - An attendant shall be stationed as needed to warn and protect employees where signs and barricades do not provide sufficient warning and protection.