

# Clarksville-Montgomery County School System ELECTRICAL SAFETY AND RELATED WORK PRACTICES PROGRAM

OSHA Standard - [29 CFR 1910.331](#)

## 1.0 **SUMMARY**

The intent of the Electrical Safety and Related Work Practices Program (ESRWP) is to prevent electrical related injuries and property damage. The United States Department of Labor, Occupational Safety and Health Administration (OSHA), promulgated the *Electrical Safety Related Work Practice Regulations*, 29 CFR 1910.331 to 1910.339 with regards to *Subpart O (Machinery and Machine Guarding)* and *Subpart S (Electrical)*. The regulations became effective in December, 1990, except for training provisions, which became effective August 6, 1991.

Clarksville-Montgomery County School System (CMCSS) relies on many different types of energy to power the equipment. Electricity is one of the most valuable and versatile forms of energy. Most of the equipment receives power from multiple energy sources, which interact with each other. Failure to respect its potential, or take proper safeguards in its use, creates conditions which may result in bodily injury or property damage.

The Electrical Safety Program covers the following:

- Responsibilities
- Definition of terms
- Use of work practices and safety rules
- Use of power equipment
- Personal protection
- General protective equipment and tools
- Hazard warning and barricades
- Training

## 2.0 **POLICY**

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## 3.0 **PROGRAM CONTENT**

The Electrical Safety Program covers the following:

- Responsibilities
- Definition of terms
- Use of work practices and safety rules
- Use of power equipment
- Personal protection

- General protective equipment and tools
- Hazard warning and barricades
- Training

CMCSS Electrical Safety guidelines are intended to protect employees from electrical hazard exposure even though equipment may be in compliance with the installation requirements in *Subpart S (Electrical)*. When employees are working with electrical equipment, they must use safe work practices. Such safety-related work practices include keeping a prescribed distance from exposed energized lines, avoiding the use of electrical equipment when the employee or the equipment is wet, and locking out and tagging equipment which is de-energized for maintenance.

Other important safety practices involving the use of electrical protective devices include rubber gloves and rubber mats for the purpose of insulating against live parts, and live-line tools for purposes of both insulation and manipulation of energized parts from a distance. However, to assure the protection of the employee, this equipment must be properly manufactured and maintained.

In general, employees are considered in two categories; Qualified and Unqualified. Qualified employees should understand that adherence to the Electrical Safety and Related Work Practices Program (ESRWP) is required while servicing or performing any type of maintenance on equipment. When performing maintenance, the Qualified employees must also understand the OSHA Standard 1910.14, *Control of Hazardous Energy* (ref. RSK-PRO14 *Lockout/Tagout Program*). The Lockout/Tagout Standard helps safeguard employees from hazardous energy while they are servicing or performing maintenance on machines and equipment.

For the program to be successful, Maintenance supervisors and employees must be responsible to follow the ESRWP program. Supervisors are responsible for providing training to Qualified and Unqualified employees and oversee daily compliance. Management/Supervision must be aware of the Electrical Safety and Related Work Practices Procedures and participate in the program. Employees, Qualified or Unqualified, must understand the hazards of working with or around electricity and why it is so important to follow all the safe work practices. Effective training is the key to developing these awareness factors.

Qualified employees will require training to cover responsibilities, review of general Electrical Safety Work Practices Rules and specific rules. Additionally, Safe Operation Procedures for routine operations should be developed and utilized.

Unqualified employees will require training to cover the general Electrical Safety Related Work Practice Rules.

This program refers to Qualified and Unqualified employees that work on or near exposed energized parts. Qualified refers to those employees that have knowledge and training to avoid the electrical hazards of working on or near energized parts. Unqualified refers to those employees that have little or no knowledge and training to avoid electrical hazards. Exposure to energized equipment or circuits includes working on or near exposed energized parts, working on energized equipment, and working on or near overhead power lines.

#### **4.0 RESPONSIBILITIES**

Supervisors and employees share the responsibility to follow the ESRWP Program. Department supervisors will be responsible to provide training and oversee daily compliance.

#### **5.0 USE OF WORK PRACTICE AND SAFETY RULES**

Unqualified employees will avoid all contact with energized parts to prevent electric shock or other injuries resulting from direct contact.

Equipment and circuits that can be de-energized to perform maintenance, repairs, connection, adjustments, etc., must follow established Lockout/Tagout Program (ref. RSK-PRO14). The Lockout/Tagout Program is clearly defined and available for use. When working on or near live parts with less than 50 volts to ground, the equipment need not be de-energized if there will be no increased exposure to electrical burns or to explosion from electric arcs.

## **6.0 WORKING ON OR NEAR EXPOSED ENERGIZED PARTS**

In general, most electrical equipment can be effectively de-energized through application of the Lockout/Tagout Program (ref. RSK-PRO14). However, in situations where energized equipment or working in near proximity to energized equipment (direct contact or contact with tools and material) can not be de-energized, the following work practices should be employed that are suitable to the conditions of the work environment and the voltage to which they are exposed:

- Qualified employees will remove all conductive clothing and jewelry (rings, watches, wrist/neck chains, metal buttons, metal writing instruments, etc.) when working on or near exposed energized parts.
- Qualified employees shall use personal protective equipment, shields and/or barriers to effectively insulate them from exposure to energized parts. This may include insulated gloves, aprons, rubber soled shoes, insulated shields, insulated tools, etc.
- Unqualified employees shall be prohibited from working on or near exposed energized parts.
- Employees may not enter areas with exposed energized parts unless Illumination (lighting) is provided so that employees may work safely. Employees may not reach around obstructions of view or lighting (blindly) into areas where exposed energized parts are located.
- Qualified employees entering a confined space with exposed energized parts must use protective barriers, shields, equipment, or insulated materials rated at or above the present voltage to avoid contact. (ref. RSK-PRO2 Confined Space Program)
- Doors or other hinged panels shall be constructed and secured to prevent them from swinging into an employee and causing contact with exposed energized parts.
- Housekeeping in areas of exposed energized parts may not be completed in areas with close contact unless adequate safeguards (insulation equipment or barriers) are present. Conductive cleaning material (Steel Wool, Silicon Carbide, etc.) or liquids may not be used unless appropriate procedures, such as Lockout/Tagout are in place and followed.

## **7.0 WORKING ON OR NEAR OVERHEAD POWER LINES**

When work is to be done on or near overhead power lines, the lines must be effectively de-energized and grounded, or other protective measures provided, before a Qualified employee starts work. If other protective measures are employed, they must effectively prevent employees from contacting such lines directly or indirectly through conductive materials, as follows:

- Qualified employees will remove all conductive clothing and jewelry (rings, watches, wrist/neck chains, metal buttons, metal writing instruments, etc.) prior to working on or near overhead power lines.
- Qualified employees shall use personal protective equipment, shields and/or barriers to effectively insulate them from exposure to energized parts. This may include insulated gloves, aprons, and rubber soled shoes, insulated shields, insulated tools, etc.
- Unqualified employees shall be prohibited from working on or near overhead power lines and must remain at least:
  1. 10 feet away from power line equal to or less than 50,000 Volts, or,
  2. 10 feet away plus 4 inches for every 10,000 Volts over 50,000 Volts from power line (Example: 60,000 Volt power line requires a minimum distance of 10 feet 4 inches)
- Only non-conductive or insulated tools and materials may be used while working on or near overhead power lines (Example: ladders, pliers, hand tools, power tools, etc.)
- Qualified employees may not approach overhead power lines any closer than the following table:

<b>Voltage Range (AC)</b>	<b>Minimum Approach Distance</b>
Under 300V	Avoid Contact
300V to 750V	1 ft. 0 in.
751V to 2kV	1 ft. 6 in.
2,001V to 15kV	2 ft. 0 in.
15,001V to 37kV	3 ft. 0 in.
37,001V to 87.5kV	3 ft. 6 in.
87,501V to 121kV	4 ft. 0 in.

- Overhead power lines may not be any closer than 10 feet at 50,000 Volts to the path of any vehicle or raised structure from a vehicle. For every 10,000 volts over 50,000 Volts, an additional 4-inch clearance should be added. A minimum of 4 feet clearance to an overhead power line at 50,000 Volts (plus 4 inches for every 10,000 Volts over 50,000 Volts) is required for any vehicle with its structure lowered.

Overhead power lines that cross a vehicles path should be no closer than 20 feet from the ground as measured from its lowest point.)

- Insulating barriers may be installed on overhead power lines to meet or exceed the rated voltage. The minimum approach distance/clearance may be reduced to the designed working dimensions of the barrier.
- Employees using an aerial lift that is insulated for the present voltage and is qualified to perform the desired work may reduce the approach distance to the table listed above in Item # 6.
- Employees standing on the ground may not contact any vehicle or mechanical equipment or any of its attachments unless:

1. Employee is using protective equipment rated for the voltage present, or
  2. If the vehicle or equipment is located so that no un-insulated portion may contact or come any closer than what is defined in Item # 6.
- Employees standing on the ground may not contact or stand near the intentional grounding portion of a vehicle or equipment with a raised structure whenever there is a possibility of overhead power line contact. Appropriate precautions; such as, barricades, insulation, etc., will be used to protect those employees and provide a means of warning.

## **8.0 USE OF POWERED EQUIPMENT**

Electrical equipment is defined as cord or plug-type electrical devices, which include the use of flexible or extension cords. Examples of portable electrical equipment included powered hand tools, powered bench tools, fans, radios, etc. The following safety rules apply to portable electrical equipment (PEE):

- PEEs shall be handled in such a manner as to not cause damage. Power cords may not be stapled or otherwise hung in a way that may cause damage to the outer jacket or insulation.
- PEEs shall be visually inspected for damage, wear, cracked or spilt outerjackets or insulation, etc., before each use PEEs that remain connected once put in place need not be inspected until relocated. Any defects; such as cracked or split outer jackets or insulation must be repaired, replaced or placed out of service immediately.
- Always check the compatibility of cord sets and receptacles for proper use.
- Ground type cord sets may only be used with ground type receptacles when used with equipment requiring a ground type conductor.
- Attachment plugs and receptacle may not be altered or connected in a way that would prevent the proper continuity of the equipment-grounding conductor. Adapters may not be used if they interrupt the continuity of the grounding conductor.
- Only portable electrical equipment that is double insulated or designed for use in areas that are wet or likely to contact conductive liquids may be used.
- Employees that are wet or have wet hands may not handle PEEs (plug-in, un-plug, etc). Personal protective equipment must be used when handling PEEs that are wet or covered with a conductive liquid.
- Locking-type connectors shall be properly secured after connection to a power source.

Electrical power and lighting circuits are defined as devices specifically designed to connect, disconnect or reverse circuits under a power load condition. When these circuits are employed, the following rules apply:

- Cable connectors (not of load-break type) fuses, terminal plugs or cable splice connectors may not be used, unless an emergency, to connect, disconnect or reverse in place of proper electrical circuits.

- After a protective circuit is disconnected or opened, it may not be connected or closed until it has been determined that the equipment and circuit can be safely energized.
- Over current protectors of circuits or connected circuits may not be modified, even on a temporary basis, beyond the installation safety requirements.
- Only Qualified employees and/o Licensed Electricians may perform test on electrical circuits or equipment.
- Test equipment and all associated test leads, cables, power cords, probes and connectors shall be visually inspected for external damage before use. Any damage or defects shall be repaired before use or placed out of service.
- Test equipment shall be rated to meet or exceed the voltage being tested and fit for the environment in which it is being used.
- Where flammable or ignitable materials are stored, even occasionally, electrical equipment capable of igniting them may not be used unless measures are taken to prevent hazardous conditions from developing.

## **9.0 PERSONAL PROTECTIVE EQUIPMENT**

Employees working in areas where the potential contact with exposed electrical sources is present and likely, will be provided and shall use Personal Protective Equipment (PPE). The following rules apply to the use and care of PPEs:

- PPEs shall be used where contact with exposed electrical sources are present and likely.
- PPEs shall be designed for the work being performed and environment in which it is used.
- PPEs shall be visually inspected and/or tested before use. Any defects or damage shall be replaced, repaired or discarded.
- In cases where the insulating capabilities of the PPEs may be damaged, a protective outer cover, such as leather, must be used.
- Employees shall wear non-conductive head protection wherever there is a danger of injury from electrical burns or shock from contact with exposed energized parts.
- Employee shall wear protective eye/face equipment whenever there is a danger from electrical arcs or flashes or from flying objects resulting from an electrical explosion.

## **10.0 GENERAL PROTECTIVE EQUIPMENT AND TOOLS**

General Protective Equipment and Tools shall be used when in proximity or working on exposed energized parts. The following rules apply:

- When working on or near exposed energized parts, Qualified employees shall use insulated tools or handling equipment suitable for the voltage present and working environment. In cases where the insulation may be damaged, a protective outer layer should be employed.
- Fuse handling equipment, insulated for the circuit voltage, shall be used to remove or install fuses when the terminal is energized.

- Ropes and other hand lines used near exposed energized equipment shall be non-conductive.

## **11.0 WARNINGS AND BARRICADES**

Warnings and barricades shall be employed to alert unqualified employees of the present danger related to exposed energized parts. The following rules apply:

- Safety signs, warning tags, etc., must be used to warn unqualified employees of the electrical hazards present, even temporarily, that may endanger them.
- Non-conductive barricades shall be used with safety signs to prevent unqualified employees access to exposed energized parts or areas.
- Where barricades and warning signs do not provide adequate protection from electrical hazards, an attendant shall be stationed to warn and protect employees.

## **12.0 TRAINING**

The Electrical Safety and Related Work Practices Program requires that each employee receive Safety Training to avoid electrical related injuries. Employees are categorized in two areas; namely, Qualified and Unqualified. With a variety of exposure to electrical equipment and circuits, each employee should be trained to a level necessary to avoid an electrical related injury or accident. All employees considered unqualified should not be permitted to work on or near exposed energized parts.

- **Training for Unqualified Employees**

Training for unqualified employees, those not specifically covered as listed below, should center on the review of the General Electrical Safety and Related Work Practices Rules. General Rules will be posted for the employees future reference. Employee signature on the Safety Training Sign-In sheet shall complete documentation of Safety Training.

- **Training for Qualified Employees**

Training for Qualified employees should include review of General Electrical Safety and Related Work Practices Program.

Additionally, Safe Operation Procedures for routine operations should be developed and utilized. The Supervisor, Maintenance Supervisor or Safety Designee should conduct site specific training, or on the job training.

## **13.0 ELECTRICAL INSPECTION**

The Electrical Safety and Related Work Practices Program has many procedures that are designed to maintain a safe and healthy work environment, free from hazards, and performing the Electrical Inspection is a part of that program. The objective of the inspection is to assist the supervisor and department head in recognizing unsafe conditions, recommending change, and following up on changes.

An Electrical Inspection shall be performed monthly either by the Maintenance Supervisor, Electrician and/or Supervisor Designee at the facility. The Electrical Inspection Checklist will be

completed to identify problems while they're still small and prevent them from leading to conditions which may result in bodily injury or property damage (ref. [RSK-F004](#)).

Associated Documents: [29 CFR 1910.147 Control of Hazardous Energy](#)  
RSK-PRO14 Lockout/Tagout Program  
RSK-PRO2 Confined Space Program  
Training Sign-In Sheets  
[RSK-F004](#) Electrical Inspection Checklist