



## **Delaware State University**

**University Area Responsible:** Risk and Safety Management

**Policy Number and Name:** 7-04: Electrical Safety Policy

**Approval Date:** 7/28/11

**Revisions:** 8/7/2013

**Reviewed:** 7/26/2013

**Related Policies and Procedures:** 7-29: Protective Equipment Hazard

Assessment, 7-30: Vendors and Contractors Safety Procedure

### **1. Purpose**

This Policy complies with the requirements set by the Electrical Standard 29 CFR 1910 of the Occupational Safety and Health Administration's (OSHA). It is meant to assure the safety of employees who may work on electrical systems at Delaware State University (DSU). It assures that all departments that perform electrical work on campus do so by following the same work practices and regulatory requirements.

### **2. Policy**

All department or employees and contractors that carryout any type of electrical work at Delaware State University will do so in a responsible and safe manner and will comply with the standards and regulations set by OSHA for electrical safety.

### **3. Scope**

All University employees working on wiring and installations of electric conductors and equipment and feeder circuit conductors in or on buildings, structures, and in other areas such as yards, parking lots and confined-spaces must abide by this Policy. This Policy also applies to the installation of optical fiber cable near or with electric wiring. Contractors must also comply with this Policy while working at DSU.

Electrical safety procedures are considered to be one of the most important safety control measures at Delaware State University. Failure of any employee to follow these procedures shall be considered a major and serious violation of safety policy and can result in disciplinary action. The rules contained in this section apply to all employees.

### **4. Procedure**

#### **4.1 Training**

- 4.1.1 Supervisors** will ensure that employees who face a risk of electrical shock in their work receive training from the Safety/Risk Manager.
- 4.1.2 Authorized Employees** working on or near exposed energized parts must receive training in the following:
  - 4.1.2.1** Ability to distinguish exposed live parts from other parts of electric equipment.
  - 4.1.2.2** Ability to determine the nominal voltage of exposed live parts.
  - 4.1.2.3** The clearance distances specified for working on or near exposed energized parts along with the corresponding voltages to which Authorized Employees will be exposed.
  - 4.1.2.4** Specific approach boundaries (i.e., *flash protection boundary, limited approach boundary, restricted approach boundary and prohibited approach boundary*).
  - 4.1.2.5** Electrical Hazards and Safety Awareness for Authorized Employees training, from the Safety/Risk Manager.
- 4.1.3 Authorized Employees** working on energized equipment that involves either direct contact, or contact by means of tools or materials, must be trained on how

to work safely on energized circuits. These employees must be familiar with proper precautionary work practices, personal protective equipment, insulating and shielding materials, and the use of insulated tools.

- 4.1.3.1** The designation of Authorized Employee and the appropriate training will be the responsibility of the Department Supervisor and the Safety/Risk Manager.
- 4.1.3.2** Training must be performed before the employee is assigned duties involving work around or on electrical systems.
- 4.1.3.3** Retraining will be performed whenever inspections performed by the employee's supervisor and the Safety Risk Manager indicate that an employee does not have the necessary knowledge or skills to safely work on or around electrical systems.
- 4.1.3.4** Retraining will also be performed when policies or procedures change and/or new equipment or systems are introduced into the work area.

## **4.2 General Requirements**

- 4.2.1** All entrance doors to rooms, buildings, or enclosures containing exposed live parts and which are accessible to unauthorized personnel shall be kept locked.
- 4.2.2** All substation gates are to be kept locked.
- 4.2.3** Any work area where exposed, energized conductors or live parts are present shall be barricaded and controlled to prevent affected persons from contacting such equipment.
- 4.2.4** Underground Utility Surveys are required when excavating or penetrating 6" or more into ground surface or in any case when power excavation equipment is used at Delaware State University. Utility surveys need to be requested through the Safety/Risk Manager.
- 4.2.5** Clear access in front of all electrical panel boards, switchboards, and disconnects shall be maintained at all times.
- 4.2.6** Storage of materials in substations or under exposed high voltage lines is prohibited.
- 4.2.7** Portable ladders used for electrical tasks shall have non-conductive side rails.
- 4.2.8** Only authorized personnel, trained in the use of electrical test equipment, shall operate and use electrical test equipment.
- 4.2.9** Unauthorized personnel are prohibited from opening electrical enclosures. They may only operate isolating devices of 50 Volts or less.
- 4.2.10** Energized parts operated at less than 50 volts and which pose no significant electrical burn or arc flash hazard (arc energy less than 1.2

cal/cm<sup>2</sup> ) are not required to be de-energized to satisfy an electrically safe work condition.

**4.2.11** Compliance with the University Lockout/Tag-out/ program is required when electrical work is being performed.

**4.3 Before starting each job, the employee in charge shall conduct a job briefing with other personnel involved. The briefing shall cover such subjects as:**

- 4.3.1** Hazards associated with the job, work procedures involved, special precautions, energy source controls, and Personal Protection Equipment requirements.
- 4.3.2** If the work or operations to be performed during the work day or shift are repetitive and similar, at least one job briefing shall be conducted before the start of the first job of the day or shift.
- 4.3.3** Additional job briefings shall be held if significant changes might affect the safety of employees during the course of the work.
- 4.3.4** A brief discussion shall be satisfactory if the work involved is routine and if the employee, by virtue of training and experience, can reasonably be expected to recognize and avoid the hazards involved in the job.

**4.4 Electrical Installation Requirements**

**4.4.1 Free from Recognized Hazards** - Electrical equipment must be free from recognized hazards that are likely to cause death or serious physical harm. Equipment must be appropriate for the installation and use, and must be installed and used in accordance with any instructions included in the listing or labeling and maintained in accordance with the National Electrical Code (NEC) and/or Occupational Safety and Health Administration (OSHA).

**4.4.2 Labeling of Disconnects**

**4.4.2.1** Each *disconnecting means*, must be clearly labeled to indicate the circuit's function unless it is located and arranged so the purpose is evident. Identification should be specific rather than general; a branch circuit serving receptacles in a main office should be labeled as such, not simply labeled "receptacles". All labels and marking must be durable enough to withstand the environment to which they may be exposed and must include nominal voltage being utilized by the device.

**4.4.2.2** Energy from more than one source – motors and motor operated equipment with more than one source of power may have multiple disconnects. Where multiple *disconnecting means* are provided, a permanent warning sign shall be provided on or adjacent to each *disconnecting means*.

**4.4.3 Guarding of Live Parts** - Live parts of electric equipment operating at 50 volts or more must be guarded against accidental contact. Proper guarding can be achieved by use of an approved cabinet or other approved enclosure or by location in a room or vault that is accessible to Authorized Employees only. If electric equipment is located in an area where it is potentially exposed to physical damage, the enclosure or guard must be of sufficient strength to prevent such damage.

**4.4.4 Warning Signage** - Entrances to rooms and other guarded locations that contain exposed live parts operating at 50 volts or more shall be marked with conspicuous warning signs forbidding Unauthorized Employees to enter.

#### **4.4.5 General Wiring Design and Protection**

**4.4.5.1** New electrical wiring, and the modification, extension or replacement of existing wiring must conform to the requirements of NEC, the National Fire Protection Association (NFPA), and OSHA.

**4.4.5.2** No grounded conductor may be attached to any terminal or lead so as to reverse designated polarity.

**4.4.5.3** The grounding terminal or grounding-type device on receptacles, cord connector, or attachment plug may not be used for any purpose other than grounding.

**4.4.5.4** Conductors and equipment must be protected from over-current above their listed current carrying capacity.

**4.4.5.5** All alternating current systems of 50 to 1,000 volts must normally be grounded as required by the NEC and OSHA. The path to ground from circuits, equipment and enclosures must be permanent and continuous.

**4.4.5.6** Conductors entering boxes, cabinets or fittings must be protected from abrasion, and openings through which conductors enter must be effectively closed. Unused openings in cabinets, boxes and fixtures must also be effectively closed.

**4.4.5.7** All pull boxes, junction boxes and fittings must be provided with covers approved for the purpose. If metal covers are used they must be grounded. In completed installations, each outlet box must have a cover, faceplate or fixture canopy. Pull boxes and junction boxes for systems over 600 volts, nominal, must provide complete enclosure, the boxes must be closed by suitable covers securely fastened in place, and the cover must be permanently marked "High Voltage."

**4.4.5.8** Switchboards and panel boards that have exposed live parts must be located in permanently dry locations and accessible to Authorized Employees only. Panel boards must be mounted in cabinets, cutout boxes or other approved enclosures, and must be *dead front* unless accessible to Authorized Employees only. Receptacles installed in damp

or wet locations must be suitable for the location. Exposed blades of knife switches must be dead when open unless the switch is connected to circuits or equipment inherently capable of providing a back-feed source of power. (For such installations a warning sign stating “**WARNING - LOAD SIDE OF TERMINALS MAY BE ENERGIZED BY BACKFEED**” or equivalent, shall be posted in close proximity to the switch).

- 4.4.5.9 Cabinets, cutout boxes, fittings, boxes and panel board enclosures in damp or wet locations must be installed to prevent moisture or water from entering and accumulating within the enclosure. In wet locations the enclosures must be weatherproof.
- 4.4.5.10 Fixtures, lamp holders, lamps, rosettes, and receptacles may have no live parts normally exposed to employee contact.
- 4.4.5.11 Screw-base light socket adapters do not maintain ground continuity and may not be used.
- 4.4.5.12 Multi-plug receptacle adapters may not maintain ground continuity or may overload circuits and must not be used. If additional receptacles are needed in a work location, additional circuits and/or receptacles must be installed.
- 4.4.5.13 Multi-plug power strips with over-current protection are acceptable for use with electronic equipment, however, they may not be “daisy-chained” (i.e., two or more power strips plugged into each other in a chain).

#### **4.5 Personnel Protection - Protective Equipment**

- 4.5.1 Employees working in areas where there are potential electrical hazards must be provided with, and must use, electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed.
- 4.5.2 Rubber insulating equipment must meet applicable American Society of Testing and Materials (ASTM) standards. **Manufactured equipment which does not indicate compliance with these ASTM standards must be tested using the a-c and d-c proof tests and related procedures as described in these ASTM standards.**
- 4.5.3 Blankets, gloves and *sleeves* must be produced by seamless process.
- 4.5.4 Insulating blankets, matting, covers, lines, hose, gloves, and *sleeves* made of rubber must be marked to indicate the class of equipment (e.g., Class 0 equipment must be marked Class 0, Class 1 marked Class 1, and so forth).
- 4.5.5 Non-ozone-resistant equipment other than matting must be marked Type I.
- 4.5.6 Ozone-resistant equipment other than matting shall be marked Type II. Markings must be nonconductive and must be applied in a way that will not damage the insulating qualities. Markings on gloves must be confined to the cuff portion of the glove.

**4.5.7** Equipment must be free of harmful physical irregularities. Surface irregularities (e.g., indentions, protuberances, or imbedded foreign materials) may be present on rubber goods because of imperfections on forms or molds or because of manufacturing difficulties.

## **5. Responsibilities**

### **5.1 Safety/Risk Manager is responsible for:**

- 5.1.1** Developing and implementing the Electrical Safety Program.
- 5.1.2** Providing training for supervisors and employees working on electrical work assignments.
- 5.1.3** Keeping records of training, energy control procedures, and program evaluations.
- 5.1.4** Conducting evaluations of the Electrical Safety Program on at least a yearly basis.
- 5.1.5** Providing contractors with a copy of DSU's Electrical Safety Program prior to any work being done. Contractors must comply with all local, state, federal and University safety requirements (e.g., OSHA, National Electric Code), and make sure that their employees are trained and licensed.

### **5.2 Contractors must:**

- 5.2.1** Comply with DSU's Electrical Safety Program requirements as well as any other safety policy applicable.
- 5.2.2** Confirm that the electrical equipment components are operationally intact and that no electrical hazard exists upon re-energization by authorized DSU employees after repairs, maintenance or installations have been completed by Contractor employees.

### **5.3 All University employees are responsible for reporting unsafe electrical installations and activities by contacting the Safety/Risk Manager.**