Chapter 8: Electrical Safety

Flexible Heating Device Requirements

1 Purpose

The purpose of these requirements is to ensure the safe use of flexible heating devices, such as heater tape and heater blankets. They cover installing and operating such devices. They apply to workers.

Flexible heating devices are typically used for baking out vacuum systems, controlling the temperature of gas cylinders, and de-icing. These devices can pose several hazards. By design, they can become hot enough to cause burns or possibly ignite combustibles (such as clothing and fabric). The electrical elements in them can pose a potential shock hazard to personnel if not used properly. With prolonged use, these elements can fray to the point where strands of heating wire protrude through the protective insulation. In addition, the insulating material used in these devices poses a hazard: fiberglass and aluminosilicate fiber insulation can cause irritation to the skin or respiratory tract. Other potential hazards can arise from the device design or installation methods.

2 Requirements

2.1 Installation

All installations must follow the following minimum precautions.

2.1.1 Before Installation

- Conduct a hazard analysis before each installation to identify unique hazards.
- All systems composed of electrically conductive elements must be properly grounded before applying flexible heating devices. ESH coordinators or the SLAC electrical safety officer can provide guidance on proper equipment grounding.
- De-energize and follow lock-out/tag-out procedures for the heating device’s energy source before installation or removal. (See Chapter 51, “Control of Hazardous Energy”.)
- Use proper personnel protective equipment (PPE) as required to mitigate hazards posed by the insulating materials. ESH coordinators or ESH industrial hygiene staff can provide guidance on the proper handling of these materials.
- Use one of the following personnel protection methods to prevent or mitigate electrical shock hazards:
  - Use a ground-fault circuit interrupter (GFCI) on all installations. If the heating device is used with a Variac, the GFCI must be placed upstream of the autotransformer to operate properly.
– Cover the installation with a grounded conductive shield. Only personnel who have completed electrical safety training can then work on the system.

2.1.2 During Installation

 Follow the manufacturer’s installation and operating instructions carefully.
 Do not cut or alter the heater tape length. Altering the tape’s length will change wattage, and can cause overheating.
 Do not cross or lap heater tape directly over itself or another tape. Excessive heating could occur and the heater tape would burn out.
 The installation must be clearly marked with safety signs to identify the hazards (for example, VOLTAGE PRESENT – DO NOT TOUCH, or DANGER – HIGH TEMPERATURES PRESENT).

2.2 Operation

 Before each use, inspect the device. Replace it if there are any signs of excessive wear, brittleness, or deterioration (discolored or burnt surfaces, especially at the plug); charring, cuts, breaks, or unraveling in insulation; or exposed conductors.

3 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)
 Chapter 8, “Electrical Safety”
 Chapter 51, “Control of Hazardous Energy”

Other SLAC Documents
 Industrial Hygiene Program

Other Documents
 Underwriters’ Laboratories (UL) 943, “Ground-Fault Circuit-Interrupters” (UL 943)