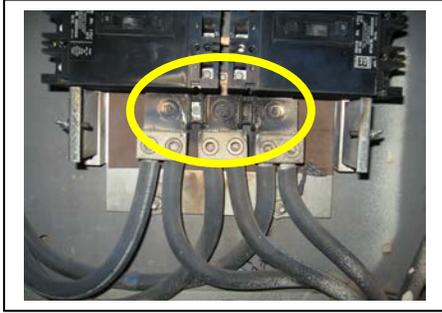


# SAFETY POINTERS WORKING WITH ELECTRICAL EQUIPMENT



This is a picture of a damaged Electrical Panel caused by an electrical arc flash-(July, 2013). The location of the panel is in Mechanical Engineering. Though this event is uncommon, equipment can fail. Individuals working on equipment that fails may be at risk of an injury from an electrical arc explosion.

***\*Learn how to prevent this from happening to you!***

***What is an electrical arc flash?*** – An arc flash is a sudden release or explosion of energy due to a fault condition or short circuit in electrical equipment. This event happens quickly. It can generate a significant pressure wave and produce a vast amount of heat capable of producing 2<sup>nd</sup> and 3<sup>rd</sup> degree burns. Installation of electrical equipment according to code requirements and routine preventative maintenance reduce the chances of an electrical arc fault occurrence.

***What was the Incident Energy of the electrical arc flash?*** - Incident energy is the amount of energy (thermal) impressed on a surface (skin) generated during an electrical arc event. One of the units used to measure this energy is calories per centimeter squared (cal/cm<sup>2</sup>). One calorie is equivalent to the thermal energy produced by holding a lighter one inch from the skin for one second. This will produce a second degree burn, OUCH! The calculated incident energy of this incident was 6.4 cal/cm<sup>2</sup> when standing 18 inches away from the equipment with the breaker panel cover open.

***What can cause this to happen inside of electrical equipment such as in the breaker panel above or a disconnect box?*** - Over time materials inside of the equipment can break down such as insulators made of plastics or even cardstock. These materials help to prevent arc flash. Dust and corrosion can build up and create a path for current. Older equipment can be more prone and equipment in general is subject to how well it is maintained for mechanical integrity.



***Equipment is designed to be safe, right?*** - Yes, equipment is designed to be safe but the explosive force of an electrical arc is very FORCEFUL! The force can overcome the springs, clamps and other design features intended to act as a barrier against such an unexpected force. These materials can be subject to breakdown, too.

***I don't want anyone to get hurt if they have to do \*maintenance on research or shop equipment. How do you safely operate a disconnect switch on equipment to shut down the electrical power before doing \*maintenance?*** – [\*Maintenance on research equipment can include but is not limited to: diagnostics, installing parts, making adjustments, inspections, testing, cleaning, or dismantling equipment].

Use “**Left Hand Rule**”. Turn your face and body away from the disconnect during operation of the switch and turn switch on/off with your **left hand**. Use protective equipment to help prevent injuries in the event of an electrical arc explosion: \*Leather glove on left hand and \*100% cotton long sleeve garment - (burns), \*hearing protection - (explosive noise), and \*safety glasses - (shrapnel).



***Remember!*** Only authorized (certified and trained) electricians can perform services or repairs on electrical equipment where there is any risk of coming into contact with energized conductors- (i.e. Facilities Management, Manufacturers' Service Technicians, or Equipment Contractors). These authorized individuals are qualified to recognize, prepare for and mitigate electrical hazards when equipment is energized. If you need UVA Facilities Management's assistance with electrical repairs, service, preventive maintenance or installation, please contact their service desk.

**Academic Facilities & Grounds (924-1777); Health System Facilities & Grounds (924-2267).**

**Electrical Safety Work Practices to Operate:** \_\_\_\_\_

**Location:** \_\_\_\_\_

**Voltage:** \_\_\_\_\_

[Reference: NFPA 70E Standard for Electrical Safety in the Workplace-2012 Edition; Table 130-7(C)(15)(a)-page 33 and Table 130.7(C)(16) page 39]

Individuals must be trained (documented) that they have been informed of the following precautions to take when operating \_\_\_\_\_.

To prevent any risk of injury in the event of an equipment failure the following personal protective equipment (PPE) is required to be worn:

1. 100% long sleeve shirt – for burn protection (absolutely no polyester, fleece or synthetic material which can exacerbate a burn injury);
2. Safety glasses –to protect eyes from shrapnel;
3. Hearing Protection –to protect ears from explosive noise;
4. Leather glove on left hand - for burn protection.
5. Long pants (i.e.100% cotton such as blue jeans) are preferable to be worn in addition to above. However, primary injury risk from burns is to torso and face.

In addition to wearing PPE use the **LEFT HAND RULE** when operating: a breaker, disconnect or other as listed above.

1. Turn your face and body away from the equipment
2. Use gloved left hand to operate the breaker, disconnect switch or other as listed above.

CAUTION

PROTECT YOURSELF FROM AN ELECTRICAL ARC EXPLOSION IN EVENT EQUIPMENT FAILS.

WHEN OPERATING SWITCH USE LEFT HAND AND TURN FACE AWAY.



Use safety glasses, hearing protection, 100% long sleeve cotton garment and leather glove on left hand

**I have read these precautions and understand how to proceed safely when operating a breaker.**

**Print Name:**

**Employee's/Student's Signature:**

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1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_