PHYSICAL RESOURCES

# Electrical Shop Safe Work Procedure

## 5.1.3 Personal Protective Equipment

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## 1. Scope

The following procedure shall be followed when performing testing or troubleshooting on energized electrical equipment or anytime workers are or could be exposed to electrical hazards.

## 2. Procedure

The following personal protective equipment (PPE) shall be used when testing and troubleshooting electrical equipment.
As in any work operation, PPE is very important when working with electrical equipment.

### 2.1. Conductive Objects

Watches, rings, neck chains or any conductive items that could make accidental contact with energized parts shall not be worn.

### 2.2. Foot Protection

Properly fitted CSA Z195-certified green patch omega rated leather boots. Boots shall have a minimum height of 6”, be free from excessive wear and damage with no visible holes or missing treads on soles.

### 2.3. Hearing Protection

Hearing protection shall be in the form of ear canal inserts or arc rated earmuffs.

### 2.4. Hard hat

Hard hats shall CSA Z94.1-certified and be no older than 5 years old as indicated under the front beak of the hat. Hard hats will be electrically insulated for up to 20,000V and be rated Class E.

### 2.5. Eye Protection

Properly fitted, CSA Z94-certified safety glasses with non-conducting frames and non-detachable side shields. Prescription glasses shall meet the Z94 standard.

### 2.6. Work Gloves (General Purpose)

In all cases a general-purpose glove will be used to prevent injury due to heat, cold, sharp edges and abrasion.

### 2.7. Electrical Rubber Gloves/Mats

Any time testing and troubleshooting is performed on energized electrical equipment up to 750 volts, minimum Class 0 rubber gloves with leather protectors shall be worn and Class 0 rubber mats shall be used if required to provide barriers to live parts. In the case where system voltage exceeds 750 volts rubber gloves rated at voltage Class 2 shall be worn.

Only rubber gloves that have received initial acceptance tests in accordance with ASTM F2675 and ASTM D120 specifications shall be used. All rubber protective equipment will be tested on an on-going basis in accordance with the test frequencies prescribed by ASTMF496 (before first issue and every 6 months thereafter).

### 2.8. Rubber gloves shall:

2.8.1. Be always maintained in a safe working order.

2.8.2. Never be worn inside out or without leather protectors.

2.8.3. Be exchanged any time they become damaged, or the employee to whom they are assigned has reason to doubt their condition.

2.8.4. Be air tested, and along with leather protectors, visually inspected, immediately prior to use.

2.8.5. Be stored in a proper manner when not in use. Proper storage includes leather protectors being removed from the rubber insulating gloves after each use, both sets of gloves being placed in a storage bag with the glove fingers oriented to the top of the bag.

2.8.6. Be re-tested by a recognized testing laboratory at least every 6 months.

## 3. Ground Fault Circuit Interrupters

When using extension cords or portable electrical equipment in wet or damp locations they shall be protected by a ground fault circuit interrupter (GFCI) installed at the receptacle, on the circuit at the panel, or on the cord as per Physical Resources Standard Operating Procedure 1.4.10 Ground Fault Circuit Interrupters.

## 4. Work Clothing

Workers shall wear clothing that is resistant to ignition and propagation of flame when working on or around energized equipment. Shirts shall have full-length sleeves, pants shall be full length and closures all fastened to adequately protect the arms, chest and legs from burns.

Arc rated, flame resistant and natural fibre clothing such as cotton, linen or wool are acceptable as work clothing. Additional PPE and arc rated clothing may be required based on the task and ratings of the electrical equipment. Workers shall consult the arc flash hazard analysis label to determine which PPE Category of clothing to employ. Flame Resistant (FR) clothing and Arc Rated clothing are not the same. Although all Arc Rated clothing has flame resistant properties, FR rated clothing has not been tested with electric arcs and is not considered to be a suitable substitute for Arc Rated clothing.

## 5. PPE Categories

Where the PPE Category is listed on the equipment arc flash hazard analysis label, the following chart shall be referenced to determine what PPE is required. In all cases it is acceptable to wear a higher level of PPE than that required by the chart or the arc flash hazard analysis.

| PPE Category | PPE Requirements |
|---|---|
| 1 | Arc rated clothing, minimum arc rating of 4 cal/cm2 (16.75 J/cm2) |
| | Arc rated long-sleeve shirt and pants, or arc rated coverall |
| | Arc rated faceshield or arc rated suit hood |
| | Arc rated jacket, parka, rainwear, or hard hat liner |
| | Hard hat |
| | Eye protection |
| | Hearing protection |
| | Leather gloves |
| | Foot protection |
| 2 | Arc rated clothing, minimum arc rating of 8 cal/cm2 (33.5 J/cm2) |
| | Arc rated long-sleeve shirt and pants, or arc rated coverall |
| | Arc rated faceshield and arc rated balaclava or arc rated suit hood |
| | Arc rated jacket, parka, rainwear, or hard hat liner |
| | Hard hat |
| | Eye protection |
| | Hearing protection |
| | Leather gloves |
| | Foot protection |
| 3 | Arc rated clothing, minimum arc rating of 25 cal/cm2 (104.7 J/cm2) |
| | Arc rated long-sleeve shirt and pants, or arc rated coverall |
| | Arc rated suit hood |
| | Arc rated jacket, parka, rainwear, or hard hat liner |
| | Hard hat |
| | Eye protection |
| | Hearing protection |
| | Leather gloves |
| | Foot protection |
| 4 | Arc rated clothing, minimum arc rating of 40 cal/cm2 (104.7 J/cm2) |
| | Arc rated long-sleeve shirt and pants, or arc rated coverall |
| | Arc rated suit hood |
| | Arc rated jacket, parka, rainwear, or hard hat liner |
| | Hard hat |
| | Eye protection |
| | Hearing protection |
| | Leather gloves |
| | Foot protection |

| Location | Hazard Class | Description |
|---|---|---|
| Panel Boards 240 volts and less. | 1 | Removing covers to expose live bus or conductors. |
| | 1 | Work on or near energized parts including voltage testing and lockout procedures. |
| Panel Boards >240 volts and up to 600 volts and less. | 2 | Removing covers to expose live bus or conductors. |
| | 2 | Work on energized parts including voltage testing. |
| | 2 | Switch or fuse operation doors open. |
| 600 volt class motor control centres. | 4 | Removing covers to expose live bus or conductors. |
| | 4 | Application of protective grounds. |
| | 4 | Work on control circuits. |
| | 4 | Work on energized parts including voltage testing. |
| | 4 | Switch, starter or fuse operation doors open. |
| 600 volts class switchgear with power circuit breakers or fused switches. | 4 | Removing hinged covers to expose live bus or conductors. |
| | 4 | Removing bolted covers to expose live bus or conductors. |
| | 4 | Application of grounds after voltage test. |
| | 4 | Racking of circuit breakers doors closed. |
| | 4 | Racking of circuit breakers doors open. |
| | 4 | Work on control circuits. |
| | 4 | Work on energized parts including voltage testing. |
| | 4 | Switch, breaker or fuse operation doors open. |
| Switchgear > 1000 volts. | 4 | Removing hinged covers to expose live bus or conductors. |
| | 4 | Removing bolted covers to expose live bus or conductors. |
| | 4 | Application of grounds after voltage test. |
| | 4 | Racking of circuit breakers doors closed. |
| | 4 | Racking of circuit breakers doors open. |
| | 4 | Work on control circuits. |
| | 4 | Work on energized parts including voltage testing. |
| | 4 | Switch breaker or fuse operation doors open. |

## 6. Relevant Legislation

Occupational Health and Safety Act, 1990.

## 7. Related Policies, Procedures and Documents

CSA Z462-18

Revision History

| Revision No. | Revision Date (M,Y) | Summary of Change |
|---|---|---|
| 00 | May, 2015 | N/A |
| 01 | October, 2019 | Format |
| 02 | February, 2020 | Updated to current Z462 requirements |