

expands by a factor of 67,000 times as it vaporizes, in the same way that water expands about 1,670 times when it becomes steam. This accounts for the expulsion of near-vaporized droplets of molten metal in an arc. It also generates plasma (ionized vapor) that moves outward from the arc for distances proportional to the arc energy. This heat, with the addition of molten metal droplets emanating from the arc, can cause serious burns to nearby crew members.

Another consequence of arcs is damage to equipment and nearby structures. One study found that the pressure from a 100 kA, 10 kV arc reached a pressure level of about 400 lb/ft<sup>2</sup> at a distance of just over three feet. This force could easily destroy a conventional wall at a distance up to 40 feet away. A smaller 25 kA arc blast could destroy a wall or equipment at a distance of nearly 10 feet. This same 25 kA arc can create as much as 160 lb/ft<sup>2</sup> of pressure on an individual two feet from the arc source. This would place 480 lbs. of force upon an average person's body. It is certainly enough energy to knock an electrician from a ladder or throw him/her across the room.

This level of pressure has also been found to cause ear damage. At a 2-foot distance from an arc blast the noise level is 142 dBA. OSHA noise standard requires the wearing of hearing protective devices starting at 85/90 dBA noise levels. Company employees should be issued earmuffs for hearing protection, since the use of the disposable insert hearing protection devices may expose employees to these ear protection inserts being driven into their ears by the arc blast pressure wave.

Electrical equipment must sometimes be worked on while energized. This means that Company employees could be exposed to energized circuits during a fault. The risk of a fault occurring while employees are in close proximity to equipment must be taken into account by the Foreman when conducting the job hazard survey and crew members' safety requirements addressed in the job task electrical safety action plan.

## 7.0 WORK SITE ACCESS CONTROL

### 7.1 APPROACH BOUNDARIES

Foremen can follow the NFPA 70E Table 2-1.3.4 - 2000 Edition to set up approach distances to exposed energized electrical conductors (see page 22). This table identifies boundaries for limited approach, restricted approach and prohibited approach. The table establishes satisfactory distances between a qualified and unqualified person and conductors that have not been placed in an electrically safe work condition.

The Limited Approach Boundary (columns 2 and 3) is the limit of approach distance for unqualified persons to a live part. In concept, unqualified people are less capable of recognizing a shock and flash hazard. Therefore, these site workers should remain at a safer distance from open, energized conductors. When there is a need for an unqualified person to cross the limited approach boundary to perform a minor task, or look at equipment, a qualified person should advise him/her of the possible hazards and ensure the unqualified person is safeguarded. Under no circumstances should an unqualified person be permitted to cross the restricted approach boundary.

The Exposed Movable Conductor (column 2) is intended to mean that either the conductor might move (as in an overhead line) or the worker might move (as in an articulating support platform). A fixed circuit part (column 3) refers to a task where the conductor is not expected to move, such as, within a unit substation.

The Restricted Approach Boundary (column 4) is the closest distance for an "unqualified person". Under no circumstances should an unqualified person be permitted to cross the restricted approach boundary. To cross this boundary, a person must:

- Be a qualified person.
- Have an approved plan.
- Use personal protective equipment approved for the conditions.
- Position his or her body in a way that minimizes risk of inadvertent contact.

In some instances, work outside the restricted approach boundary, but within the worker's reach, may be classified as restricted work, if in the judgment of the Foreman, conductive objects or ungrounded body parts could make unintentional contact or cross the prohibited approach boundary.

The Prohibited Approach Boundary (column 5) is the minimum approach distance to an exposed energized conductor or circuit part and is the closest point to prevent flashover.

To cross this boundary and enter the prohibited space should be considered the same as making contact with exposed energized conductors or circuit parts.

To do so, the Foreman must:

- Develop job task plan and state why the work must be done inside the prohibited approach boundary.
- Obtain Site Superintendent's approval prior to starting any work on energized conductors or circuit parts.
- Only assign qualified employees to work on energized conductors or circuit parts.
- Ensure crew members wear approved PPE for working on or near exposed energized conductors or circuit parts and that PPE is rated for the voltage and energy level involved.

When performing work inside the prohibited approach boundary on systems with a voltage greater than 300 volts phase-to-phase, the crew member performing the work will be inside the flash hazard boundary.

Prohibited work should not be performed on equipment with a flash hazard boundary greater than 6 inches. It should be noted that voltage-rated rubber products are permitted to be closer than these dimensions.

**APPROACH BOUNDARIES TO LIVE PARTS FOR SHOCK PROTECTION**

(From the NFPA 70E-Table 2-1.3.4) - 2000 Edition. All dimensions are distance from live part to employee.

| Column (1)                                  | (2)   | (3)                        | (4)  | (5)                                 |
|---|---|----------------------------|--|-------------------------------------|
| Nominal System Voltage Range Phase-to-Phase | <u>Limited Approach Boundary</u><br>Exposed Movable Conductor | Exposed Fixed Circuit Part | <u>Restricted Approach Boundary</u><br>Includes Inadvertent Movement Adder | <u>Prohibited Approach Boundary</u> |
| 51 to 300                                   | 10 ft.  | 3 ft. 6 in.                | Avoid Contact  | Avoid Contact                       |
| 301 to 750                                  | 10 ft.  | 3 ft. 6 in.                | 1 ft.  | 1 in.                               |
| 751 to 15 kV                                | 10 ft.  | 5 ft.                      | 2 ft. 2 in.  | 7 in.                               |
| 15.1 kV to 36 kV                            | 10 ft.  | 6 ft.                      | 2 ft. 7 in.  | 10 in.                              |
| 36.1 kV to 46 kV                            | 10 ft.  | 8 ft.                      | 2 ft. 9 in.  | 1 ft. 5 in.                         |
| 46.1 kV to 72.5 kV                          | 10 ft.  | 8 ft.                      | 2 ft. 10 in.   | 2 ft. 1 in.                         |
| 72.6 kV to 121 kV                           | 10 ft. 8 in.  | 8 ft.                      | 3 ft. 2 in.  | 2 ft. 8 in.                         |
| 138 kV to 145 kV                            | 11 ft.  | 10 ft.                     | 3 ft. 7 in.  | 3 ft. 1 in.                         |
| 161 kV to 169 kV                            | 11 ft. 8 in.  | 11 ft. 8 in.               | 4 ft.  | 3 ft. 6 in.                         |
| 230 kV to 242 kV                            | 13 ft.  | 13 ft.                     | 5 ft. 3 in.  | 4 ft. 9 in.                         |
| 345 kV to 362 kV                            | 15 ft. 4 in.  | 15 ft. 4 in.               | 8 ft. 6 in.  | 8 ft.                               |
| 500 kV to 550 kV                            | 19 ft.  | 19 ft.                     | 11 ft. 3 in.   | 10 ft. 9 in.                        |
| 765 kV to 800 kV                            | 23 ft. 9 in.  | 23 ft. 9 in.               | 14 ft. 11 in.  | 14 ft. 5 in.                        |

Notes: All dimensions are from live part to employee.

For SI Units: 1 in. = 25.4 mm, 1 ft. = 0.3048 m.

For flash protection boundary, see 2-1.3.3.2 of NFPA 70E

Columns 1 through 5 of Table 2-1.3.4 show various distance from the exposed energized electrical conductors or circuit parts. These include dimensions that are added to a basic minimum air insulation distance. The basic minimum air insulation distances for voltages 72.5 kV and under are based upon ANSI/IEEE 4-1995, Standard Techniques for High-Voltage Testing, Appendix 2B and for voltages more than 72.5 kV are based upon ANSI/IEEE 516-1995, Guide for Maintenance Methods on Energized Power Lines.

Air Insulation Flashover Distances are the minimum air insulation distances required to avoid flashover. These have been recommended as:

| <u>Voltage Flashover</u>       | <u>Distance</u> |
|--------------------------------|-----------------|
| 300 V and less                 | 0.03 in.        |
| 300 V and less 750 V           | 0.07 in.        |
| Over 750 V, not over 2 kV      | 0.19 in.        |
| Over 2 kV, not over 15 kV      | 1.5 in.         |
| Over 15 kV, not over 36 kV     | 6.3 in.         |
| Over 36 kV, not over 48.3 kV   | 10 in.          |
| Over 48.3 kV, not over 72.5 kV | 1 ft. 3 in.     |
| Over 72.5 kV, not over 121 kV  | 2 ft. 1.2 in.   |
| Over 121 kV, not over 145 kV   | 2 ft. 6.6 in.   |
| Over 145 kV, not over 161 kV   | 3 ft.           |
| Over 161 kV, not over 230 kV   | 4 ft. 2.4 in.   |
| Over 230 kV, not over 345 kV   | 7 ft. 5.8 in.   |
| Over 345 kV, not over 500 kV   | 10 ft. 2.5 in.  |
| Over 500 kV, not over 800 kV   | 13 ft. 10.3 in. |

The following discussion provides information about why each distance in the Table 2-1.3.4 is a specific dimension.

**Column # 1:** The voltage ranges have been selected to group voltages that require similar approach distances based on the sum of the electrical withstand distance and an inadvertent movement factor. The value of the upper limit for a range is the maximum voltage for highest nominal voltage in the range based on ANSI C84.1. For single-phase systems, select the range that is equal to the system's maximum phase-to-ground voltage times 1.732.

**Column # 2:** The distances in this column are based upon OSHA's rule for unqualified persons to maintain a 10 ft. (3.02m) clearance for all voltages up to 50 kV (voltage-to-ground), plus 0.4 in (102 mm) for each 1 kV over 50 kV.

**Column # 3:** The distances are based on the following:

- 750 V and lower, use NEC Table 110.26 (A) Working Spaces, Condition 2 for 151- 600 V range.
- For voltages over 750 V, but not over 145 kV, use NEC Table 110.34(A) Working Space, Condition 2.
- For over 145 kV, use OSHA's 10 ft (3.05 m) rules as used in Column # 2.

**Column # 4:** The distances are based on adding to the flashover dimensions shown above the following inadvertent movement distance:

- 300 V and less, avoid contact based upon experience and precautions for household 120/240 systems.
- Over 300 V and not over 750 V, add 1 ft 0 in. inadvertent movement.

*Note:* These values have been found to be adequate over years of use in ANSI C2 -National Electrical Safety Code in the approach distances for communication workers.

- Over 750 V and not over 72.5 kV, add 2 ft. 0 in. inadvertent movement. Over 72.5 kV, add 1 ft. inadvertent movement.
- Note:* These distances have been found to be adequate over years of use in the NESC in the approach distances for supply workers.

Column # 5: The distances are based on the following:

- 300 V and less, avoid contact.
  - Over 300 V, but less than 750 V, use Clearances from NEC table 230.51(C) - Supports.
  - Between open conductors and surfaces, 600 V not exposed to weather.
  - Over 750 V, but not over 2.0 kV, value selected that fits in with adjacent values.
  - Over 2 kV but not over 72.5 kV, use NEC Table 490.24, Minimum Clearance of Live Parts, outdoor phase-to-ground values.
  - Over 72.5 kV, add 6 inches inadvertent movement.
- Note:* These values have been found to be adequate over years of use where there has been a hazard/risk analysis, either formal or informal, of a special work procedure that allows closer approach that permitted by the restricted approach boundary distance.

*Note: It is strongly recommended that the current NFPA 70E document be reviewed by all Company representatives to verify conformance with the standard and accuracy of information prior to developing and utilizing any protective approach distances. The information provided is only a partial depiction of the standard's provisions.*

## 7.2 HAZARD RISK CATEGORY CLASSIFICATIONS

The following guidelines have been developed to assist Foreman in determining the appropriate personal protective equipment that qualified crew members must wear, while performing their job tasks on energized electrical components or circuits parts and the work is done within the flash protection boundary. The Foreman and Company must reevaluate the application and accuracy of these guidelines and utility of the PPE that is selected before beginning work. These guidelines may apply only when:

- The Foreman has performed the job hazard survey and found that the equipment to be worked on has normal short circuit current capacities and fault clearing times for the 600 volts and below.
- The Foreman has found that the specific job task is not listed in these guidelines or that the power system is greater than the assumed normal short circuit current capacity or for longer than assumed fault clearing times and therefore has made a flash hazard analysis in accordance with NFPA 70E Part II 2-1.3.3

*Note:* In order to perform a flash hazard analysis the Foreman will need to know the arc flash boundary. This is the linear distance between the body part that is exposed, such as the hand or face, and the potential arc flash source. The potential arc flash source is most often the closest uninsulated electrical conductor. The Foreman can set-up the arc flame boundary at 4 feet based upon a clearing time of 6 cycles and an available bolted fault current of 50,000 amperes or any combination, where the product of the two does not exceed 300,000 ampere cycles or 5,000 ampere seconds. However, when the available fault currents are high (above 50,000 amperes) or when the overcurrent devices have a built-in short-time delay, the Foreman must calculate the required arc flame boundary.

The PPE requirements are intended to protect qualified crew members from shock and arc flash hazards. While some events may result in burns to the skin, even with the PPE being worn, any burn injury should be relatively minor and survivable. However, due to the explosive effect of some arc blast, physical trauma injuries may occur. Even those qualified crew members wearing a blast suit, blast pants, and other PPE will be exposed to physical trauma injuries.

ation to the PPE required to be worn, as listed below, each crew member should be required to wear long-sleeved shirt, long pants, cotton underwear and cotton T-shirt, cotton long-sleeve shirt, untreated long denim cotton blue jeans, leather safety boots, hard hat-class B, and safety glasses with sideshields.

*Note #1:* Employees should not be permitted to wear contact lenses and, when employees are wearing prescription eyeglasses, safety goggles must be worn.

*Note #2:* As required, crew members should wear a flame resistant jacket, parka, or rain gear.

a. PANELBOARDS RATED 240 VOLTS AND ABOVE HAVING 25,000 AMPERES SHORT CIRCUIT CURRENT AVAILABLE, 0.03 SECOND (2 CYCLE) FAULT CLEARING TIME.

*Note:* For < 10,000 amperes short circuit current exposures see NFPA 70E-Table 3-3.9.1

- CIRCUIT BREAKER (CB) OR FUSED SWITCH OPERATION WITH COVERS ON - No other PPE required.
- CB OR FUSED SWITCH OPERATION WITH COVERS OFF- No other PPE required.
- WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING - FR Coverall, Rubber Gloves, and Use Insulated Tools.
- REMOVE/INSTALL CBS OR FUSED SWITCHES - FR Coverall, Rubber Gloves, and Use Insulated Tools.
- REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - FR Coverall.
- OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - No other PPE required.

b. PANELBOARDS OR SWITCHBOARDS RATED 240 VOLTS TO 600 VOLTS (WITH MOLDED CASE OR INSULATED CASE CIRCUIT BREAKERS) HAVING 25,000 AMPERES SHORT CIRCUIT CURRENT AVAILABLE, 0.03 SECOND (2 CYCLE) FAULT CLEARING TIME.

*Note:* For < 10,000 amperes short circuit current exposures see NFPA 70E-Table 3-3.9.1

- CB OR FUSED SWITCH OPERATION WITH COVERS ON - No other PPE required.
- CB OR FUSED SWITCH OPERATION WITH COVERS OFF- No other PPE required.
- WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves and Use Insulated Tools.

c. 600 VOLTS CLASS MOTOR CONTROL CENTERS (MMCS) - 65,000 AMPERES SHORT CIRCUIT CURRENT AVAILABLE, 0.03 SECOND (2 CYCLE) FAULT CLEARING TIME, EXCEPT AS INDICATED.

*Note:* For < 10,000 amperes short circuit current available exposures see NFPA 70E-Table 3-3.9.1

- CB OR FUSED SWITCH OR STARTER OPERATION WITH ENCLOSURE DOORS CLOSED - No other PPE required.
- READING A PANEL METER WHILE OPERATING A METER SWITCH - No other PPE required.
- CB OR FUSED SWITCH OR STARTER OPERATION WITH ENCLOSURE DOORS OPEN - FR Coverall.
- WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves and Use Insulated Tools.
- WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS 120 V OR BELOW, EXPOSED - Rubber Gloves and Use Insulated Tools.

- WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS >120 V EXPOSED - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves and Use Insulated Tools.
- INSERTION OR REMOVAL OF INDIVIDUAL STARTER "BUCKETS" FROM MCC. - 65,000 AMPERES SHORT CIRCUIT CURRENT AVAILABLE, 0.33 SECOND (20 CYCLE) FAULT CLEARING TIME - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves and FR Hard Hat Liner.
- APPLICATION OF SAFETY GROUNDS, AFTER VOLTAGE TEST- FR Coverall, Double-Layer Switching Hood, Hearing Protection, and Rubber Gloves.
- REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - FR Coverall, Double-Layer Switching Hood, Hearing Protection, and FR Hard Hat Liner.
- OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - FR Coverall.
- d. 600 VOLT CLASS SWITCHGEAR (WITH POWER CIRCUIT BREAKERS OR FUSED SWITCHES) 65,000 AMPERES SHORT CIRCUIT CURRENT AVAILABLE, UP TO 1.0 SECOND (60 CYCLE) FAULT CLEARING TIME. Note: For < 25,000 amperes short circuit current available exposures see NFPA 70E-Table 3-3.9.1
- CB OR FUSED SWITCH OPERATION WITH ENCLOSURE DOORS CLOSED - No other PPE required.
- READING A PANEL METER WHILE OPERATING A METER SWITCH - No other PPE required.
- CB OR FUSED SWITCH OPERATION WITH ENCLOSURE DOORS OPEN - FR Coverall.
- WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves and Use Insulated Tools.
- WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS 120 V OR BELOW, EXPOSED - FR Coverall, Rubber Gloves and Use Insulated Tools.
- WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS >120 V EXPOSED - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and Use Insulated Tools.
- INSERTION OR REMOVAL (RACKING) OF CBS FROM CUBICLES, DOORS OPEN - FR Coverall, Double-Layer Switching Hood, and Hearing Protection.
- INSERTION OR REMOVAL (RACKING) OF CBS FROM CUBICLES, DOORS CLOSED - FR Coverall, and as required Double-Layer Switching Hood, Hearing Protection and FR Hard Hat Liner.
- APPLICATION OF SAFETY GROUNDS, AFTER VOLTAGE TEST - FR Coverall, Double-Layer Switching Hood, Hearing Protection, and Rubber Gloves.
- REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - FR Coverall, Double-Layer Switching Hood, Hearing Protection, and FR Hard Hat Liner.
- OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - FR Coverall, and as required Double-Layer Switching Hood, and Hearing Protection.

OTHER 600 VOLTS CLASS (277 VOLTS TO 600 VOLTS, NOMINAL) EQUIPMENT.

Note: For < 10,000 amperes short circuit current available exposures see NFPA 70E-Table 3-3.9.1

1. LIGHTING OR SMALL POWER TRANSFORMERS (600 VOLTS, MAXIMUM).

- REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - FR Coverall, Double-Layer Switching Hood, and Hearing Protection.
- OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - FR Coverall.
- WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and Use Insulated Tools.
- APPLICATION OF SAFETY GROUNDS, AFTER VOLTAGE TEST -FR Coverall, Double-Layer Switching Hood, Hearing Protection, and Rubber Gloves.

2. REVENUE METERS (KW-HOUR, AT PRIMARY VOLTAGE AND CURRENT).

- INSERTION OR REMOVAL - FR Coverall, Double-Layer Switching Hood, Hearing Protection, and Rubber Gloves.
- CABLE TROUGH OR TRAY COVER REMOVAL OR INSTALLATION - FR Coverall.
- MISCELLANEOUS EQUIPMENT COVER REMOVAL OR INSTALLATION - FR Coverall.
- WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and Use Insulated Tools.
- APPLICATION OF SAFETY GROUNDS, AFTER VOLTAGE TEST - FR Coverall, Double-Layer Switching Hood, Hearing Protection, and Rubber Gloves.

f. NEMA E2 (FUSED CONTACTOR) MOTOR STARTERS, 2,300 VOLTS TO 7,200 VOLTS

- CONTACTOR OPERATION WITH ENCLOSURE DOORS CLOSED - No other PPE required.
- READING A PANEL METER WHILE OPERATING A METER SWITCH - No other PPE required.
- CONTACTOR OPERATION WITH ENCLOSURE DOORS OPEN - FR Coverall, Double-Layer Switching Hood, and Hearing Protection.
- WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, FR Hard Hat Liner, and Use Insulated Tools.
- WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS 120 V OR BELOW, EXPOSED - Rubber Gloves, and Use Insulated Tools.
- WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS >120 V, EXPOSED - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, FR Hard Hat Liner, and Use Insulated Tools.
- INSERTION OR REMOVAL (RACKING) OF STARTERS FROM CUBICLES, DOORS OPEN - FR Coverall, Double-Layer Switching Hood, and Hearing Protection.

- INSERTION OR REMOVAL (RACKING) OF STARTERS FROM CUBICLES, DOORS CLOSED - FR Coverall, and as required Double-Layer Switching Hood, and Hearing Protection.
- APPLICATION OF SAFETY GROUNDS, AFTER VOLTAGE TEST - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and FR Hard Hat Liner.
- REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - Flash Suit, Flash Pants, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and FR Hard Hat Liner.
- OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - FR Coverall, Double-Layer Switching Hood, Hearing Protection, and FR Hard Hat Liner.

g. METAL-CLAD SWITCHGEAR, 1,000 VOLTS AND ABOVE

- CB OR FUSED SWITCH OPERATION WITH ENCLOSURE DOORS CLOSED - FR Coverall, and as required Double-Layer Switching Hood, and Hearing Protection.
- READING A PANEL METER WHILE OPERATING A METER SWITCH - No other PPE required.
- CB OR FUSED SWITCH OPERATION WITH ENCLOSURE DOORS OPEN - Flash Suit, Flash Pants, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and FR Hard Hat Liner.
- WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING - Flash Suit, Flash Pants, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, FR Hard Hat Liner, and Use Insulated Tools.
- WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS 120 V OR BELOW, EXPOSED - FR Coverall, Rubber Gloves, Use Insulated Tools and as required Double-Layer Switching Hood, and Hearing Protection.
- WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS >120 V, EXPOSED - Flash Suit, Flash Pants, Double-Layer Switching Hood, Ear Protection, Rubber Gloves, FR Hard Hat Liner, and Use Insulated Tools.
- INSERTION OR REMOVAL (RACKING) OF CBS FROM CUBICLES, DOORS OPEN - Flash Suit, Flash Pants, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and FR Hard Hat Liner.
- INSERTION OR REMOVAL (RACKING) OF CBS FROM CUBICLES, DOORS CLOSED - FR Coverall, and as required Double-Layer Switching Hood, and Hearing Protection.
- APPLICATION OF SAFETY GROUNDS, AFTER VOLTAGE TEST - Flash Suit, Flash Pants, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and FR Hard Hat Liner.
- REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - Flash Suit, Flash Pants, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and FR Hard Hat Liner.
- OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - FR Coverall, Double-Layer Switching Hood, Hearing Protection, and FR Hard Hat Liner.
- OPENING VOLTAGE TRANSFORMER OR CONTROL POWER TRANSFORMER COMPARTMENTS - Flash Suit, Flash Pants, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and FR Hard Hat Liner.



POWER EQUIPMENT 1,000 VOLTS AND ABOVE: METAL CLAD LOAD INTERRUPTER SWITCHES, FUSED OR UNFUSED.

- SWITCH OPERATION, DOORS CLOSED - FR Coverall, and as required Double-Layer Switching Hood, and Hearing Protection.
- WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING - Flash Suit, Flash Pants, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, FR Hard Hat Liner, and Use Insulated Tools.
- REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - Flash Suit, Flash Pants, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and FR Hard Hat Liner.
- OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS) - FR Coverall, Double-Layer Switching Hood, Hearing Protection, and FR Hard Hat Liner.
- OUTDOOR DISCONNECT SWITCH OPERATION (HOOKSTICK OPERATED) - FR Coverall, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, FR Hard Hat Liner, and Use Insulated Tools.
- OUTDOOR DISCONNECT SWITCH OPERATION (GANG-OPERATED, FROM GRADE) - FR Coverall, and as required Double-Layer Switching Hood, and Hearing Protection.
- INSULATED CABLE EXAMINATION, IN MANHOLE OR OTHER CONFINED SPACE - Flash Suit, Flash Pants, Double-Layer Switching Hood, Hearing Protection, Rubber Gloves, and FR Hard Hat Liner.
- INSULATED CABLE EXAMINATION, IN OPEN AREA - FR Coverall, Rubber Gloves, and as required Double-Layer Switching Hood, and Hearing Protection.

## 8.0 JOB TASK ELECTRICAL SAFE WORK PROCEDURES

### 8.1 COMPANY SAFETY POLICIES, PROCEDURES, AND ACTION PLANS

The Company's Safety & Loss Control Manual provides the safety policies, procedures, and action plans required to establish the Company project site-specific safety procedures. Site Superintendents may wish to supplement this manual with additional, more detailed procedures that are better suited to their specific site operations. However, any additional procedures must be at least as effective as the Company's Safety & Loss Control Manual.

The Company's site-specific safety procedures will address all actual and potentially hazardous phases of the Company's and the Subcontractor's site electrical work packages to eliminate or drastically reduce employees' exposures to hazardous exposures and unsafe conditions.

Based upon project information received from the Customer at the pre-bid and pre-job orientation meetings; the President and Site Superintendent should formulate a Company Pre-Construction Safety Action Plan that will address site-specific safety and loss control requirements as listed below:

- Finalize the Company's site-specific safety procedure and issue copy to Customer's Project Manager.
- Provide a copy of the Subcontractors' site-specific safety procedures to the Customer's Project Manager for review and comments prior to the start of any Subcontractors' work activities taking place on the project site.
- Deliver a copy of the Company's task-specific electrical safety procedure to the Customer's Project Manager for review and comments prior to the start of any Company work involving hazardous (classified) locations or other hazardous job tasks.