NFPA 70E
Electrical Safety in the Workplace

NFPA-70E
2015 - Major Revisions

Presented by:
Robert E. Fuhr, P.E.

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Special Thanks to

e-Hazard

- Electrical Safety Training Materials
  - Low Voltage Classes
  - High Voltage Classes
  - Refresher Classes
What is 70E and why do we need it?
What are the Electrical Hazards?

Common conditions that may increase hazard:
- Elevated location
- Confined space

Possible Results

<table>
<thead>
<tr>
<th>Direct</th>
<th>Indirect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrocutation</td>
<td>Falls</td>
</tr>
<tr>
<td>Internal/External Burns</td>
<td>Smoke Inhalation</td>
</tr>
</tbody>
</table>
## Safety Facts

### By the Numbers

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annually, U.S. averages</td>
<td>4,000</td>
</tr>
<tr>
<td>non-disabling electrical contact injuries</td>
<td></td>
</tr>
<tr>
<td>Annually, U.S. averages</td>
<td>3,600</td>
</tr>
<tr>
<td>disabling electrical contact injuries</td>
<td></td>
</tr>
<tr>
<td>Every other day</td>
<td>1</td>
</tr>
<tr>
<td>person is electrocuted in the workplace</td>
<td></td>
</tr>
<tr>
<td>Electrocutions are</td>
<td>5th</td>
</tr>
<tr>
<td>leading cause</td>
<td></td>
</tr>
<tr>
<td>of traumatic occupational fatalities</td>
<td></td>
</tr>
<tr>
<td>Each year</td>
<td>+2,000</td>
</tr>
<tr>
<td>workers are sent to</td>
<td></td>
</tr>
<tr>
<td>burn centers with electrical burns</td>
<td></td>
</tr>
</tbody>
</table>
The Code of Federal Regulations (CFR) 1910, Subpart S is the electrical safety regulations for industry.

CFR 1910, Subpart R regulates electrical safety for power generation, transmission & distribution.

- Enforceable as law
- Performance-based language
- Contains the “what,” not the “how”
- Not updated on a regular basis
State of Washington

• OSHA has jurisdiction at
  – DOD Facilities, Tribal Lands, and Marine Installations

• Washington State Plan is administered by the Department of Labor and Industries (DL&I)

• Division of Occupational Safety and Health (DOSH).

• Main office location is located in Tumwater, Washington.
 NEC vs. 70E

Normal Conditions
NEC reduces the risk for shock under normal conditions
• When equipment is operated under normal conditions, worker is not exposed to energized parts

Abnormal Conditions
Risk for shock & arc flash increase under abnormal conditions
• NFPA 70E reduces risk through safe work practices
NFPA Approach to Electrical Safety

How to...

BUILD it safely
Upgrade/replace latest NEC applies

WORK on it safely
Maintain/repair latest 70E applies

MAINTAIN it properly
Strategies in NFPA 70E

- Electrically safe work condition
- Training
- Planning
- Hazard Risk Assessment
- Engineering
- PPE & Tools
Additions and Revisions in NFPA 70E

Just like the NEC 70......
All changes are highlighted
Global Changes

- Arc flash hazard analysis now **Arc flash risk assessment**
- Electrical hazard analysis now **Electrical hazard risk assessment**
- Harm now **injury or damage to health**
- Hazard identification and risk assessment now **Risk assessment**
- Hazard Risk Category (HRC) now **Arc Flash PPE Category**
- Probability now **Likelihood**
- Shock hazard analysis now **Shock risk assessment**
Global Changes

• *Workshoes* now *Footwear*
Article 100 - Definitions

- **Risk (New Definition)** A combination of the likelihood of occurrence of injury or damage to health and the severity of injury or damage to health that results from a hazard.

- **Risk Assessment (New Definition)** An overall process that identifies hazards, estimates the potential severity of injury or damage to health, estimates the likelihood of occurrence of injury or damage to health and determines if protective measures are required.
  - Informational Note: As used in this standard, arc flash risk assessment and shock risk assessment are types of risk assessments.
Article 100 - Definitions

• Prohibited Approach Shock Boundary has been eliminated.
  – Only Limited and Restricted boundaries Remain
Simplified Shock Boundaries

- **Restricted** Approach Boundary
  - PPE & Qualified ONLY boundary – Requires EEWP
- **Limited** Approach Boundary
  - Qualified Control Boundary – Prohibits unqualified persons without escort by qualified

**480 VAC Energized Source**

NFPA 70E 130.4
## Low Voltage Shock Boundaries

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Shock Boundaries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Limited</td>
</tr>
<tr>
<td></td>
<td>Movable Conductor</td>
</tr>
<tr>
<td>Exposed...</td>
<td></td>
</tr>
</tbody>
</table>

**AC**

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Limited</th>
<th>Restricted</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50 V</td>
<td>Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>50 – 150 V</td>
<td>3.0 m (10’)</td>
<td>1.0 m (3’ 6”)</td>
</tr>
<tr>
<td>151 – 750 V</td>
<td>3.0 m (10’)</td>
<td>1.0 m (3’ 6”)</td>
</tr>
<tr>
<td></td>
<td>0.3 m (12”)</td>
<td></td>
</tr>
</tbody>
</table>

*OSHA LV Cutoff 600 V AC*

*Tables 130.4(D)(a)/(b)*
• **110.1(B) Maintenance**
  - The electrical safety program shall include elements that consider condition of maintenance of electrical equipment and systems.

• **110.3 Relationships with Contractors (Outside Service Personnel, and So Forth).**
  - (C) Documentation. Where the host employer has knowledge of hazards covered by this standard that are related to the contract employer’s work, there shall be a documented meeting between the host employer and the contract employer.
Article 130 - Work Involving Electrical Hazards

• 130.2(A) Energized Work
  – (4) Normal Operation. (New Item) Normal operation of electric equipment shall be permitted where all of the following conditions are satisfied:

  1. The equipment is properly installed
  2. The equipment is properly maintained
  3. The equipment doors are closed and secured
  4. All equipment covers are in place and secured
  5. There is no evidence of impending failure
Article 130 - Work Involving Electrical Hazards

• 130.2(A) Energized Work

**Informational Note:** The phrase properly installed means that the equipment is installed in accordance with the applicable industry codes and standards and the manufacturer’s recommendations. The phrase properly maintained means that the equipment has been maintained in accordance with the manufacturer’s recommendations and applicable industry codes and standards. The phrase evidence of impending failure means that there is evidence such as arcing, overheating, loose or bound equipment parts, visible damage, or deterioration.
• **130.2(B) Energized Electrical Work Permit**

• *(1) When Required.* When energized work is permitted in accordance with 130.2(A), an energized electrical work permit shall be required under the following conditions:

• *(1) When work is performed within the restricted approach boundary*

• *(2) When the employee interacts with the equipment when conductors or circuit parts are not exposed but an increased likelihood of injury from an exposure to an arc flash hazard exists*
130.5 Arc Flash Risk Assessment

An arc flash risk assessment shall be performed and shall:

(1) Determine if an arc flash hazard exists. If an arc flash hazard exists, the risk assessment shall determine:

a) Appropriate safety-related work practices
b) The arc flash boundary
c) The PPE to be used within the arc flash boundary
• **130.5 Arc Flash Risk Assessment**
  
  • Informational Note No. 1:
    
    – Improper or inadequate maintenance can result in increased opening time of the overcurrent protective device, thus increasing the incident energy. Where equipment is not properly installed or maintained, PPE selection based on incident energy analysis or the PPE category method may not provide adequate protection from arc flash hazards.
Article 130 - Work Involving Electrical Hazards

• 130.5 (D) Equipment Labeling
  • The owner of the electrical equipment shall be responsible for the documentation, installation, and maintenance for the field-marked label.
What Equipment Must be Labeled?

- Switchboards
- Panelboards
- Industrial Control Panels
- Meter Socket Enclosures
- Motor Control Centers

Electrical equipment… “likely to require examination, adjustment, servicing or maintenance while energized shall be field marked with a label…”

*NFPA 70E 130.5(D)*
Article 130 - Work Involving Electrical Hazards

• **130.6(H) Clear Spaces.**
  – Working space in front of electrical equipment required by other codes and standards shall not be used for storage. This space shall be kept clear to permit safe operation and maintenance of electrical equipment.
Storing Materials in Front of Equipment
• 130.7(C)(15) Selection of Personal Protective Equipment When Required for Various Tasks

• (A) Alternating Current (ac) Equipment. Where selected in lieu of the incident energy analysis of 130.5(B)(1), **Table 130.7(C)(15)(A)(a)** shall be used to identify when arc flash PPE is required. Table 130.7(C)(15)(A)(b) shall be used to determine the arc flash PPE category....
Article 130 - Work Involving Electrical Hazards

- Table 130.7(C)(15)(A)(b) & Table 130.7(C)(15)(B) Task Tables
  - Arc Flash Hazard Category 0 has been removed!!!

- Table 130.7(C)(16) Protective Equipment (PPE)
  - PPE Categories 1-4 (No Category 0)
Arc Flash Hazard Assessment Methods

IEEE 1584
Calculate:
Incident Energy Level
Arc Flash Boundary

NFPA 70E
AF Hazard Identification Table
130.7(C)(15)(A)(a)
Lookup:
Task
Is Arc Flash PPE Required?

NFPA 70E
AF PPE Categories Table
130.7(C)(15)(A)(b)
Lookup:
Equipment Type
AF PPE Category
Arc Flash Boundary

NFPA 70E
PPE Matrix Table
130.7(C)(16)
Determine:
Minimum Clothing Arc Rating
Additional PPE Required

NFPA 70E
PPE Matrix Table
H.3(b)
Determine:
Minimum Clothing Arc Rating
Additional PPE Required
130.10 Cutting or Drilling. (New Item)

Before cutting or drilling into equipment, floors, walls, or structural elements where a likelihood of contacting energized electrical lines or parts exists, the employer shall perform a risk assessment to:

- Identify and mark the location of conductors, cables, raceways, or equipment,
- Create an electrically safe work condition, and
- Identify safe work practices and PPE to be used.
Before... You Dig, Drill or Cut:

Prior to excavation, employer shall take necessary steps to have electrical lines or equipment locations identified and marked

- If reasonable possibility for contacting electrical lines or equipment exists, appropriate safe work practices and PPE shall be used during excavation

www.call811.com

Prior to cutting or drilling where there’s a likelihood of contacting energized electrical lines or parts

- Employer shall perform risk assessment to:
  - Identify location
  - Create an electrically safe work condition
  - Determine safe work practices and PPE to be used

NFPA 70E 130.9
NFPA 70E 130.10
Article 200 - Safety-Related Maintenance Requirements

• 205.3 General Maintenance Requirements
  – ….The equipment owner or the owner’s designated representative shall be responsible for maintenance of the electrical equipment and documentation.

• 205.15 Overhead Line Clearances. (New Section)
  – For overhead electrical lines under the employer’s control, grade elevation shall be maintained to preserve no less than the minimum designed vertical and horizontal clearances necessary to minimize risk of unintentional contact.

• 210.5 Protective Devices
  – Informational Note: Improper or inadequate maintenance can result in increased opening time of the overcurrent protective device, thus increasing the incident energy.
Time vs. Incident Energy
(Fault Current Constant @ 30 kA)

- Increasing Interrupting Times
- Increases Energy Levels

Incident Energy (Cal/cm$^2$)

Device Operating Time

- Incident Energy
No PPE Required for Normal Operation If…

• Equipment is properly installed
• Equipment is properly maintained
• Equipment doors are closed and secured
• All equipment covers are in place and secured
• NO evidence of impending failure
  – No visible sign of failure
  – No historical evidence of failure

NFPA 70E 130.2(A)(4)
No PPE Required for Normal Operation If…

- Really?
- Is that a good idea?
### Example Task Assignment

**Risk Assessment**

**Tighten a loose connection on a circuit breaker in an energized 240 volt, 3 phase panelboard.**

- **Available fault current:** 20 KA
- **Tripping time for the upstream protective device is 2 cycles**

### Shock Hazard Present

1. **Shock Hazard Present**
   - a) Limited Approach Boundary
   - b) Restricted Approach Boundary

### Arc Flash Hazard Present

2. **Arc Flash Hazard Present**

### Equipment Meets Table Parameters

3. **Equipment Meets Table Parameters**
   - a) PPE category
   - b) Arc Flash Boundary

### EEWP Required

4. **EEWP Required**

---

*Insulated Gloves and Tools Required inside Restricted Approach Boundary 130.4(D)(1)*
Is There a Shock Hazard?

- Is equipment $\geq 50$ volts?
- Does the task require working inside the Restricted Approach Boundary?
Identify Shock Boundaries by Voltage

Pgs 26-27

<table>
<thead>
<tr>
<th>Nominal System Voltage Range, Phase to Phase</th>
<th>Exposed Movable Conductor</th>
<th>Exposed Fixed Circuit Part</th>
<th>Restricted Approach Boundary; Includes Inadvertent Movement Adder</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50 V</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>50 V–150 V</td>
<td>3.0 m (10 ft 0 in.)</td>
<td>1.0 m (3 ft 6 in.)</td>
<td>Avoid contact</td>
</tr>
<tr>
<td>151 V–750 V</td>
<td>3.0 m (10 ft 0 in.)</td>
<td>1.0 m (3 ft 6 in.)</td>
<td>0.3 m (1 ft 0 in.)</td>
</tr>
<tr>
<td>751 V–15 kV</td>
<td>3.0 m (10 ft 0 in.)</td>
<td>1.5 m (5 ft 0 in.)</td>
<td>0.7 m (2 ft 2 in.)</td>
</tr>
<tr>
<td>15.1 kV–36 kV</td>
<td>3.0 m (10 ft 0 in.)</td>
<td>1.8 m (6 ft 0 in.)</td>
<td>0.8 m (2 ft 7 in.)</td>
</tr>
</tbody>
</table>
Example Task Assignment

Tighten a loose connection on a circuit breaker in an energized 240 volt, 3 phase panelboard.

- Available fault current: 20 KA
- Tripping time for the upstream protective device is 2 cycles

<table>
<thead>
<tr>
<th></th>
<th>Shock Hazard Present</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>a) Limited Approach Boundary</td>
<td><strong>3'6”</strong></td>
</tr>
<tr>
<td></td>
<td>b) Restricted Approach Boundary*</td>
<td><strong>1’</strong></td>
</tr>
</tbody>
</table>

|   | Arc Flash Hazard Present |   |
| 2) |                        |   |

|   | Equipment Meets Table Parameters |   |
| 3) |                                  |   |
### Find Task and Determine if PPE is Required

**Table 130.7(C)(15)(A)(a) Arc Flash Hazard Identification for Alternating Current (ac) and Direct Current (dc) Systems**

<table>
<thead>
<tr>
<th>Task</th>
<th>Equipment Condition</th>
<th>Arc Flash PPE Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading a panel meter while operating a meter switch</td>
<td>Any</td>
<td>No</td>
</tr>
<tr>
<td>Normal operation of a circuit breaker (CB), switch, contactor, or starter</td>
<td>All of the following:</td>
<td>Yes</td>
</tr>
<tr>
<td>Work on control circuits with exposed energized electrical conductors and circuit parts, greater than 120 V</td>
<td>Any</td>
<td>Yes</td>
</tr>
<tr>
<td>Insertion or removal of individual starter buckets from motor control center (MCC)</td>
<td>Any</td>
<td>Yes</td>
</tr>
<tr>
<td>Insertion or removal (racking) of CBs or starters from cubicles, doors open or closed</td>
<td>Any</td>
<td>Yes</td>
</tr>
<tr>
<td>Insertion or removal of plug-in devices into or from busways</td>
<td>Any</td>
<td>Yes</td>
</tr>
<tr>
<td>Insulated cable examination with no manipulation of cable</td>
<td>Any</td>
<td>No</td>
</tr>
<tr>
<td>Insulated cable examination with manipulation of cable</td>
<td>Any</td>
<td>Yes</td>
</tr>
<tr>
<td>Work on exposed energized electrical conductors and circuit parts of equipment directly supplied by a panelboard or motor control center</td>
<td>Any</td>
<td>Yes</td>
</tr>
<tr>
<td>Insertion and removal of revenue meters (kW-hour, at primary voltage and current)</td>
<td>Any</td>
<td>Yes</td>
</tr>
</tbody>
</table>

---

**Notes:**
- The equipment is properly installed.
- The equipment is properly maintained.
- Covers for all other equipment are in place and secured.
- There is no evidence of impending failure.
- One or more of the following:
**Example Task Assignment**

Tighten a loose connection on a circuit breaker in an energized 240 volt, 3 phase panelboard.

- Available fault current: 20 KA
- Tripping time for the upstream protective device is 2 cycles

<table>
<thead>
<tr>
<th>Description</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Shock Hazard Present</td>
<td>Y</td>
</tr>
<tr>
<td>a) Limited Approach Boundary</td>
<td></td>
</tr>
<tr>
<td>b) Restricted Approach Boundary</td>
<td>3'6&quot;</td>
</tr>
<tr>
<td>2) Arc Flash Hazard Present</td>
<td>Y</td>
</tr>
<tr>
<td>3) Equipment Meets Table Parameters</td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>Arc Flash PPE Category</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Panelboards or other equipment rated 240 V and below</td>
<td>1</td>
</tr>
<tr>
<td>Parameters: Maximum of 25 kA short-circuit current available; maximum of 0.03 sec (2 cycles) fault clearing time; working distance 455 mm (18 in.)</td>
<td></td>
</tr>
<tr>
<td>Panelboards or other equipment rated &gt;240 V and up to 600 V</td>
<td>2</td>
</tr>
<tr>
<td>Parameters: Maximum of 25 kA short-circuit current available; maximum of 0.03 sec (2 cycles) fault clearing time; working distance 455 mm (18 in.)</td>
<td></td>
</tr>
<tr>
<td>600-V class motor control centers (MCCs)</td>
<td>2</td>
</tr>
<tr>
<td>Parameters: Maximum of 65 kA short-circuit current available; maximum of 0.03 sec (2 cycles) fault clearing time; working distance 455 mm (18 in.)</td>
<td></td>
</tr>
<tr>
<td>600-V class motor control centers (MCCs)</td>
<td>2</td>
</tr>
<tr>
<td>Parameters: Maximum of 42 kA short-circuit current available; maximum of 0.33 sec (20 cycles) fault clearing time; working distance 455 mm (18 in.)</td>
<td></td>
</tr>
<tr>
<td>600-V class switchgear (with power circuit breakers or fused switches) and 600 V class switchboards</td>
<td>4</td>
</tr>
<tr>
<td>Parameters: Maximum of 35 kA short-circuit current available; maximum of up to 0.5 sec (30 cycles) fault clearing time; working distance 455 mm (18 in.)</td>
<td></td>
</tr>
</tbody>
</table>
### Table 130.7(C)(16) Personal Protective Equipment (PPE)

<table>
<thead>
<tr>
<th>PPE Category</th>
<th>PPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arc-Rated Clothing, Minimum Arc Rating of 4 cal/cm² (see Note 1)</td>
</tr>
<tr>
<td></td>
<td>Arc-rated long-sleeve shirt and pants or arc-rated coverall</td>
</tr>
<tr>
<td></td>
<td>Arc-rated face shield (see Note 2) or arc flash suit hood</td>
</tr>
<tr>
<td></td>
<td>Arc-rated jacket, parka, rainwear, or hard hat liner (AN)</td>
</tr>
<tr>
<td></td>
<td><strong>Protective Equipment</strong></td>
</tr>
<tr>
<td></td>
<td>Hard hat</td>
</tr>
<tr>
<td></td>
<td>Safety glasses or safety goggles (SR)</td>
</tr>
<tr>
<td></td>
<td>Hearing protection (ear canal inserts)</td>
</tr>
<tr>
<td></td>
<td>Heavy duty leather gloves (see Note 3)</td>
</tr>
<tr>
<td></td>
<td>Leather footwear (AN)</td>
</tr>
</tbody>
</table>

| 2 | Arc-Rated Clothing, Minimum Arc Rating of 8 cal/cm² (see Note 3) |
| | Arc-rated long-sleeve shirt and pants or arc-rated coverall |
| | Arc-rated face shield (see Note 2) or arc flash suit hood |
| | Arc-rated jacket, parka, rainwear, or hard hat liner (AN) |
| | **Protective Equipment** |
| | Hard hat |
| | Safety glasses or safety goggles (SR) |
| | Hearing protection (ear canal inserts) |
| | Heavy duty leather gloves (see Note 3) |
| | Leather footwear (AN) |

Notes:

- AN: as needed (optional). AR: as required.
## Example Task Assignment

**Risk Assessment**

### Exercise

**Example Task Assignment**

Tighten a loose connection on a circuit breaker in an energized 240 volt, 3 phase panelboard.

- Available fault current: 20 KA
- Tripping time for the upstream protective device is 2 cycles

<table>
<thead>
<tr>
<th><strong>1) Shock Hazard Present</strong></th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHOCK</td>
<td></td>
</tr>
<tr>
<td>a) Limited Approach Boundary</td>
<td>3'6&quot;</td>
</tr>
<tr>
<td>b) Restricted Approach Boundary*</td>
<td>1'</td>
</tr>
</tbody>
</table>

| **2) Arc Flash Hazard Present** | Y   |

<table>
<thead>
<tr>
<th><strong>3) Equipment Meets Table Parameters</strong></th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHOCK</td>
<td></td>
</tr>
<tr>
<td>a) PPE category</td>
<td>1</td>
</tr>
<tr>
<td>b) Arc Flash Boundary</td>
<td>19&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>4) EEWP Required</strong></th>
</tr>
</thead>
</table>

* Y/N

---

* Insulated Gloves and Tools Required inside Restricted Approach Boundary 130.4(D)(1)
130.2 Energized Work. ...

(B) Energized Electrical Work Permit.

1. When Required. When energized work is permitted in accordance with 130.2(A), an energized electrical work permit shall be required under the following conditions:
   1. When work is performed within the restricted approach boundary
   2. When the employee interacts with the equipment when conductors or circuit parts are not exposed but an increased likelihood of injury from an exposure to an arc flash hazard exists

3. Exemptions to Work Permit. An energized electrical work permit shall not be required if a qualified person is provided with and uses appropriate safe work practices and PPE in accordance with Chapter 1 under any of the following conditions:
   1. Testing, troubleshooting, and voltage measuring
   2. Thermography and visual inspections if the restricted approach boundary is not crossed
   3. Access to and egress from an area with energized electrical equipment if no electrical work is performed and the restricted approach boundary is not crossed
   4. General housekeeping and miscellaneous non-electrical tasks if the restricted approach boundary is not crossed
Example Task Assignment

Tighten a loose connection on a circuit breaker in an energized 240 volt, 3 phase panelboard.

- Available fault current: 20 KA
- Tripping time for the upstream protective device is 2 cycles

### Risk Assessment

**1) Shock Hazard Present**
- a) Limited Approach Boundary: 3'6" **Y**
- b) Restricted Approach Boundary: 1' **Y**

**2) Arc Flash Hazard Present**

**3) Equipment Meets Table Parameters**

**4) EEWP Required**

* Insulated Gloves and Tools Required inside Restricted Approach Boundary 130.4(D)(1)
What is easier and safer for the employees?

• Determining Fault Current and clearing times, then use NFPA 70E Task Tables
  
  • or
  
• Look at the AF Label to determine the true energy level and AF boundary?
Arc Flash Hazard Labels - Bus

May also display such information as:

Voltage,
Flash hazard boundary,
Approach distances,
Equipment name/ID #,
Upstream device.

NFPA 70 130.3 (C)
Label for Locations where:

AF Energy > 40 cal/cm²

NFPA 70 130.3 (C)
• Questions???
An EEWP is Required When?

- Performing energized work, per 130.2(A) within the **restricted approach boundary**

- When employee interacts with equipment and an increased likelihood of injury from an arc flash exposure exists
  - conductors or circuit parts need not be exposed

Read NFPA 130.2 and 130.2(B)(1)

This issue should be addressed especially in HV applications
Energized Electrical Work Permit (EEWP)

- Requires written approval from management
- Requires the worker to do the following:
  - Identify and understand the hazards
  - Be a qualified person
  - Wear the proper PPE
  - Restrict access to unqualified persons
  - Complete a job briefing

NFPA 70E 130.2(B)(2)
No EEWP Required for:

- Testing, troubleshooting, and voltage measuring

- *If the Restricted Approach Boundary is not crossed:*
  - Thermography and visual inspections
  - Access to and egress from area with energized electrical equipment, if no electrical work is performed
  - General housekeeping and miscellaneous non-electrical tasks

Must still follow safe work practices and PPE guidelines

**TESTING IS TOUCHING.**

*NFPA 70E 130.2(B)(3)*
Obtain Equipment Nameplate Data & Settings → Short Circuit Fault Study → 3 Phase Bolted Fault Current

Coordination (PDC) Study → Device Operating Time

Arcing Fault Current

Arc Flash Study

WARNING
Arc Flash and Shock Hazard

3 Ft 8 In  Flash Hazard Boundary
5.1  cal/cm² Flash Hazard at 1 Ft 6 In
Arc Rated Clothing Required (See NFPA 70E H.3(b) for additional PPE)
480 VAC  Shock Hazard when cover is removed
00  Glove Class
10 Ft 0 In  Limited Approach (Fixed Circuit)
12 In  Restricted Approach
Equipment ID (Name):  MCC-STASRV1 (MCC STR SRV1)
Protective Device:  51 STA
Scenario 3 - Bus Tie Breakers Closed
Study Performed By PowerStudies.com (253) 639-9535