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# Electrical Safety Compliance Chart for NFPA 70E 2012

**TABLE 130.7(C)(9) HAZARD/RISK CATEGORY CLASSIFICATIONS AND USE OF RUBBER INSULATING GLOVES AND INSULATED AND INSULATING HAND TOOLS**

| Tasks Performed on Energized Equipment | Hazard/ Risk Category | Rubber Insulating Gloves | Insulated & Insulating Hand Tools |
|---|---|---|---|
| **Panelboards or Other Equipment Rated 240 V and Below-Note 1** | | | |
| Perform infrared thermography & other non-contact inspections outside the restricted approach boundary | 0 | N | N |
| Circuit breaker (CB) or fused switch operation with covers on | 0 | N | N |
| Circuit breaker (CB) or fused switch operation with covers off | 0 | N | N |
| Work on energized electrical conductors and circuit parts, including voltage testing | 1 | Y | Y |
| Remove/Install CBs of fused switches | 1 | Y | Y |
| Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts) | 0 | N | N |
| Opening hinged covers (to expose bare, energized electrical conductors and circuit parts) | 0 | N | N |
| Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the panelboard | 1 | Y | Y |
| **Panelboards or Switchboards Rated.240 V and up to 600 V (with molded case or insulated case circuit breakers) *NOTE 1** | | | |
| Perform infrared thermography & other non-contact inspections outside the restricted approach boundary | 1 | N | N |
| Circuit breaker (CB) or fused switch operation with covers on | 0 | N | N |
| Circuit breaker (CB) or fused switch operation with covers off | 1 | Y | Y |
| Work on energized electrical conductors and circuit parts, including voltage testing | 2 | Y | Y |
| Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the panelboard | 2 | Y | Y |
| **600 V Class Motor Control Center (MCCs) - Note 2 (except indicated)** | | | |
| Perform infrared thermography & other non-contact inspections outside the restricted approach boundary | 1 | N | N |
| CB or fused switch or starter operation with enclosure doors closed | 0 | N | N |
| Reading a panel meter while operating a meter switch | 0 | N | N |
| CB or fused switch or starter operation with enclosure doors open | 1 | N | N |
| Work on energized electrical conductors and circuit parts, including voltage testing | 2 | Y | Y |
| Work on control circuits with energized electrical conductors and circuit parts 120 V or below, exposed | 0 | Y | Y |
| Work on control circuits with energized electrical conductors and circuit parts >120 V or below, exposed | 2 | Y | Y |
| Insertion or removal of individual starter "buckets" from MCC- Note 3 | 4 | Y | N |
| Application of safety grounds, after voltage test | 2 | Y | N |
| Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts)- Note 3 | 4 | N | N |
| Opening hinged covers (to expose bare, energized electrical conductors and circuit parts) - Note 3 | 1 | N | N |
| Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the motor control center | 2 | Y | Y |
| **600V Class Switchgear (with power circuit breakers or fused switches) - Note 4** | | | |
| Perform infrared thermography & other non-contact inspections outside the restricted approach boundary | 2 | N | N |
| CB or fused switch or starter operation with enclosure doors closed | 0 | N | N |
| Reading a panel meter while operating a meter switch | 0 | N | N |
| CB or fused switch or starter operation with enclosure doors open | 1 | N | N |
| Work on energized electrical conductors and circuit parts, including voltage testing | 2 | Y | Y |
| Work on control circuits with energized electrical conductors and circuit parts 120 V or below, exposed | 0 | Y | Y |
| Work on control circuits with energized electrical conductors and circuit parts >120 V or below, exposed | 2 | Y | Y |
| Insertion or removal (racking) of CBs from cubicles, doors open or closed | 4 | N | N |
| Application of safety grounds, after voltage test | 2 | Y | N |
| Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts) | 4 | N | N |
| Opening hinged covers (to expose bare, energized electrical conductors and circuit parts) | 2 | N | N |
| **Other 600 V Class (277 V through 600, nominal) Equipment - Note 2 (except as indicated) Lighting or small power transformers (600 V Maximum)** | | | |
| Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts) | 2 | N | N |
| Opening hinged covers (to expose bare, energized electrical conductors and circuit parts) | 1 | N | N |
| Work on energized electrical conductors and circuit parts, including voltage testing | 2 | Y | Y |
| Application of safety grounds, after voltage test | 2 | Y | N |
| Revenue Meters (kW-hour at primary voltage and current) insertion or removal | 2 | Y | N |
| Cable trough or tray cover removal or installation | 1 | N | N |
| Misc Equipment Cover removal or installation | 1 | N | N |
| Work on energized electrical conductors and circuit parts, including voltage testing | 2 | Y | Y |
| Application of safety grounds, after voltage test | 2 | Y | N |
| Insertion or removal of plug in devices into or from busways | 2 | Y | N |
| **NEMA E2 (Fused contractor) Motor Starters, 2.3 kV through 7.2 kV** | | | |
| Perform infrared thermography & other non-contact inspections outside the restricted approach boundary | 3 | N | N |
| Contractor operation with enclosure | 0 | N | N |
| Reading a panel meter while operating a meter switch | 0 | N | N |
| Contractor operation with enclosure door open | 2 | N | N |
| Work on energized electrical conductors and circuit parts, including voltage testing | 4 | Y | Y |
| Work on control circuits with energized electrical conductors and circuit parts 120 V or below, exposed | 0 | Y | Y |
| Work on control circuits with energized electrical conductors and circuit parts >120 V, exposed | 3 | Y | Y |
| Insertion or removal (racking) of CBs from cubicles, doors open or closed | 4 | N | N |
| Application of safety grounds, after voltage test | 3 | Y | N |
| Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts) | 4 | N | N |
| Opening hinged covers (to expose bare, energized electrical conductors and circuit parts) | 3 | N | N |
| Insertion or removal (racking) of starters from cubicles of arc-resistant construction, tested in accordance with IEEE C37 20.7 doors closed only | 0 | N | N |
| **Metal Clad Switchgear, 1 kV through 38 kV** | | | |
| Perform infrared thermography & other non-contact inspections outside the restricted approach boundary | 3 | N | N |
| CB Operation with enclosure doors closed | 2 | N | N |
| Reading a panel meter while operating a meter switch | 0 | N | N |
| CB Or fused switch or starter operation with enclosure doors open | 4 | N | N |
| Work on energized electrical conductors and circuit parts, including voltage testing | 4 | Y | Y |
| Work on control circuits with energized electrical conductors and circuit parts 120 V or below, exposed | 2 | Y | Y |
| Work on control circuits with energized electrical conductors and circuit parts >120 V or below, exposed | 4 | Y | Y |
| Insertion or removal (racking) of CBs from cubicles, doors open or closed | 4 | N | N |
| Application of safety grounds, after voltage test | 4 | Y | N |
| Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts) | 4 | N | N |
| Opening hinged covers (to expose bare, energized electrical conductors and circuit parts) | 3 | N | N |
| Opening voltage transformer or control power transformer compartments | 4 | N | N |
| **ARC Resistant Switchgear Type 1 or 2 (for clearing times of <.05 with a perspective fault current not to exceed the Arc resistant rating of the equipment)** | | | |
| CB operation with enclosure doors closed | 0 | N | N |
| Insertion or removal (racking) of CBs from cubicles, doors open or closed | 0 | N | N |
| Insertion or removal of CBs from cubicles with door open | 4 | N | N |
| Work on control circuits with energized electrical conductors and circuit parts 120 V or below, exposed | 2 | Y | Y |
| Insertion or removal (racking) of ground and test device with door closed | 0 | N | N |
| Insertion or removal (racking) of voltage transformers on or off the bus door closed | 0 | N | N |
| **Other Equipment 1kV Through 38 kV Metal-enclosed interupter switch gear, fused or unfused** | | | |
| Switch operation of arc-resistant-type construction, tested in accordance with IEEE C37.20.7, doors closed only | 0 | N | N |
| Switch operation, doors closed | 2 | N | N |
| Work on energized electrical conductors and circuit parts, including voltage testing | 4 | Y | Y |
| Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts) | 4 | N | N |
| Opening hinged covers (to expose bare, energized electrical conductors and circuit parts) | 3 | N | N |
| Outdoor disconnect switch operation (hook stick operated) | 3 | Y | Y |
| Outdoor disconnect switch operation (gang-operated, from grade) | 2 | Y | N |
| Insulated cable examination, in man hole or other confined spaces | 4 | Y | N |
| Insulated cable examination, in open area | 2 | Y | N |

**General Notes (applicable to the entire table):**

**(a) Rubber insulating gloves rated for the maximum line-to-line voltage upon which work will be done.**

**(b) Insulated and insulating hand tools are tools rated and tested for the maximum line-to-line voltage upon which work will be done, and are manufactured and tested in accordance with ASTM zg 1505. *Standard Specification for Insulated Hand Tools.***

**(c) Y = yes (required), N = no (not required)**

**(d) For systems rated less than 1000 volts, the fault currents and upstream protective device clearing times are based on an 18 in. working distance.**

**(e) For systems rated 1 kV and greater, the Hazard/Risk Categories are based on a 36 in. working distance.**

**(f) For equipment protected by upstream current limiting fuses with arcing fault current in their current limiting range (1/2 cycle fault clearing time or less), the hazard/risk category required may be reduced by one number.**

**Specific Notes (as referenced in the table):**

**1. Maximum of 25 kA short circuit current available ; maximum of 0.03 sec (2 cycle) fault clearing time.**

**2. Maximum of 65 kA short circuit current available ; maximum of 0.33 sec (2 cycle) fault clearing time.**

**3. Maximum of 42 kA short circuit current available ; maximum of 0.33 sec (20 cycle) fault clearing time.**

**4. Maximum of 25 kA short circuit current available ; maximum of up to 0.5 sec (30 cycle) fault clearing time.**

**The assumed short maximum circuit current capacities and maximum fault clearing times for various tasks are listed int eh notes to table (130.7(C)(9). For Tasks not listed, or For Power systems with greater than the assumed maximum short circuit current capacity or With longer than the assumed maximum fault clearing times - AN ARC FLASH ANALYSIS SHALL BE REQUIRED IN ACCORDANCE WITH 130.3**

# PPE CATEGORY LEVEL CHART NFPA 2012

**CATEGORY 0**

**What Personal Protection Equipment (PPE) You Shall Wear:**

(X) Cotton Undergarments
(X) Long Sleeved Shirt (Natural Fiber)
(X) Long Pants (Natural Fiber)
(X) Safety Glasses or Goggles
(X) Hearing Protection (Inserts)
(X) Leather Gloves (as needed) or Insulating Gloves

**CATEGORY 1**

Ending at 4 CAL/cm$^2$

**What Personal Protection Equipment (PPE) You Shall Wear:**

(X) Cotton Undergarments
(X) ARC Rated Long Sleeved Shirt (or FR Coveralls)
(X) ARC Rated Long Pants (or FR Coveralls)
(X) Hard Hat with ARC Rated Face Shield
(X) Hearing Protection (Inserts)
(X) Safety Glasses or Goggles
(X) Leather Gloves (as needed) or Insulating Gloves
(X) Leather Shoes (as needed)

**CATEGORY 2**

Ending at 8 CAL/cm$^2$

**What Personal Protection Equipment (PPE) You Shall Wear:**

(X) Cotton Undergarments
(X) Short Sleeved “T” Shirt (Natural Fiber)
(X) ARC Rated (12cal) Arc Flash Hood or Hard Hat with Arc Rated Face Shield w/Sock Balaclava with Coveralls or Jacket & Bibs or 50” Coat with Leggings
(X) Safety Glasses or Goggles
(X) Hearing Protection
(X) Arc Rated Leather Gloves or Insulating Gloves w/Protectors
(X) Leather Shoes

**CATEGORY 3**

Ending at 25 CAL/cm$_2$

**What Personal Protection Equipment (PPE) You Shall Wear:**

(X) Cotton Undergarments
(X) Short Sleeved “T” Shirt (Natural Fiber)
(X) ARC Rated (25cal) Arc Flash Hood with Coveralls or Jacket & Bibs or 50” Coat with Leggings.
(X) Hard Hat
(X) Hearing Protection
(X) Safety Glasses or Goggles
(X) Arc Rated Leather Gloves or Insulating Gloves w/Protectors
(X) Leather Shoes

**CATEGORY 4**

Ending at 40 CAL/cm$^2$

**What Personal Protection Equipment (PPE) You Shall Wear:**

(X) Cotton Undergarments
(X) Short Sleeved “T” Shirt (Natural Fiber)
(X) Arc Rated (40cal) Arc Flash Hood with Coveralls or Jacket & Bibs or 50” Coat with Leggings
(X) Hard Hat
(X) Hearing Protection
(X) Safety Glasses or Goggles
(X) Arc Rated Leather Gloves or Insulating Gloves w/Protectors
(X) Leather Shoes

**Always wear voltage rated rubber glove liners when working above 50 volts in all categories!**

# Rubber Insulating Gloves / Leather Protectors

## ASTM Labeling Chart

| **Class of Glove**<br>Label color is determined in ASTM D120. Each class of glove has its own label color to provide a quick visual reference for end users. | **AC Proof-Test Voltage rms, V** | **Maximum AC Use Voltage ac rms, V** | **Maximum DC Use Voltage avg, V** |
|---|---|---|---|
| ANSI / ASTM D120 EN60903<br>Class 00 | 2,500 | 500 | 750 |
| ANSI / ASTM D120 EN60903<br>Class 0 | 5,000 | 1,000 | 1,500 |
| ANSI / ASTM D120 EN60903<br>Class 1 | 10,000 | 7,500 | 11,250 |
| ANSI / ASTM D120 EN60903<br>Class 2 | 20,000 | 17,000 | 25,500 |
| ANSI / ASTM D120 EN60903<br>Class 3 | 30,000 | 26,500 | 39,750 |
| ANSI / ASTM D120 EN60903<br>Class 4 | 40,000 | 36,000 | 54,000 |

## How do I know what glove to use?

First you should determine the maximum voltage that you will be exposed to during your work. Once you have determined the risk, you can use the chart to determine the appropriate class of glove that will provide you the protection required to compete your job safely. Each class of gloves is clearly marked with the maximum use voltage on the permanent color coded label.

## Arc Flash Glove Typical Applications

When it comes to purchasing arc flash gloves, there are six industries that have a high need for protection.

- Maintenance technicians working in amusement parks, hospitals, water plants, manufacturing plants, office buildings, and schools
- Power and communication utilities
- Electrical contracting and power generation
- Electrical supervisors
- Transportation - primarily rail
- Plant and facility maintenance
- Hybrid auto manufacturing, repair, and service
- Machine operators, maintenance millwrights, and mechanics
- HVAC technicians
- Elevator installers and technicians
- Field service technicians

| | |
|---|---|
| **OSHA Regulations** | **29CFR part 1910** - Occupational Safety and Health Standards |
| **ASTM Standards** | **ASTM D 120-08** - Rubber Insulating Gloves |
| | **ASTM F496-08** - In-Services Care of Insulating Gloves and Sleeves |
| | **ASTM F696-06** - Leather Protectors for Rubber Insulating Gloves and Mittens |
| | **ASTM F1236-96** - Visual Inspection of Electrical Protective Rubber Products |
| **NFPA Standards** | **National Electric Safety Code** - Utilities |
| | **NFPA 70E** - Electrical Safety in the Workplace - General Workplaces |