

Arc Flash Protective Gear

Personal Safety in Performing
Stray Voltage Investigations

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TABLE 130.7(C)(9) Hazard/Risk Category Classifications and Use of Rubber Insulating Gloves and Insulated and Insulating Hand Tools

<i>Tasks Performed on Energized Equipment</i>	<i>Hazard/Risk Category</i>	<i>Rubber Insulating Gloves</i>	<i>Insulated and Insulating Hand Tools</i>
Panelboards or Other Equipment Rated 240 V and Below — Note 1			
Perform infrared thermography and 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
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 or fused switches	1	Y	Y
See Exhibit 130.5			
Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts)	1	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 and other non-contact inspections outside the Restricted Approach Boundary

CB or fused switch operation with covers on

CB or fused switch operation with covers off

Work on energized electrical conductors and circuit parts, including voltage testing

Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the panelboard or switchboard

1

0

1

2*

2*

N

N

Y

Y

Y

N

N

N

Y

Y

TABLE 130.7(C)(9) Continued

600 Volt MCC's

<i>Tasks Performed on Energized Equipment</i>	<i>Hazard/Risk Category</i>	<i>Rubber Insulating Gloves</i>	<i>Insulated and Insulating Hand Tools</i>
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
See Exhibits 130.6 and 130.7			
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	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

600 V Class Switchgear (with power circuit breakers or fused switches) — Note 4

Perform infrared thermography and other non-contact inspections outside the restricted approach boundary	2	N	N
CB or fused switch operation with enclosure doors closed	0	N	N
Reading a panel meter while operating a meter switch	0	N	N
CB or fused switch 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, exposed	2*	Y	Y
Insertion or removal (racking) of CBs from cubicles, doors open or closed	4	N	N

See Exhibit 130.8

Other 600 V Class (277 V through 600 V, 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

Miscellaneous 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

General Notes (applicable to the entire table):

(a) Rubber insulating gloves are 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 F 1505, *Standard Specification for Insulated and Insulating 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 ($1/3$ 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 0.03 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 35 kA short circuit current available; maximum of up to 0.5 sec (30 cycle) fault clearing time.

TABLE 130.7(C)(10) Protective Clothing and Personal Protective Equipment (PPE)

<i>Hazard/Risk Category</i>	<i>Protective Clothing and PPE</i>
Hazard/Risk Category 0	
Protective Clothing, Nonmelting (according to ASTM F 1506-00) or Untreated Natural Fiber FR Protective Equipment	Shirt (long sleeve) Pants (long) Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Leather gloves (AN) (Note 2)
Hazard/Risk Category 1	
FR Clothing, Minimum Arc Rating of 4 (Note 1) FR Protective Equipment	Arc-rated long-sleeve shirt (Note 3) Arc-rated pants (Note 3) Arc-rated coverall (Note 4) Arc-rated face shield or arc flash suit hood (Note 7) Arc-rated jacket, parka, or rainwear (AN) Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Leather gloves (Note 2) Leather work shoes (AN)
Hazard/Risk Category 2	
FR Clothing, Minimum Arc Rating of 8 (Note 1) FR Protective Equipment	Arc-rated long-sleeve shirt (Note 5) Arc-rated pants (Note 5) Arc-rated coverall (Note 6) Arc-rated face shield or arc flash suit hood (Note 7) Arc-rated jacket, parka, or rainwear (AN) Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Leather gloves (Note 2) Leather work shoes
Hazard/Risk Category 2*	
FR Clothing, Minimum Arc Rating of 8 (Note 1)	Arc-rated long-sleeve shirt (Note 5) Arc-rated pants (Note 5) Arc-rated coverall (Note 6) Arc-rated arc flash suit hood (Note 10) Arc-rated jacket, parka, or rainwear (AN)

(continues)

TABLE 130.7(C)(10) Continued

<i>Hazard/Risk Category</i>	<i>Protective Clothing and PPE</i>
FR Protective Equipment	Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Leather gloves (Note 2) Leather work shoes
Hazard/Risk Category 3	
FR Clothing, Minimum Arc Rating of 25 (Note 1)	Arc-rated long-sleeve shirt (AR) (Note 8) Arc-rated pants (AR) (Note 8) Arc-rated coverall (AR) (Note 8) Arc-rated arc flash suit jacket (AR) (Note 8) Arc-rated arc flash suit pants (AR) (Note 8) Arc-rated arc flash suit hood (Note 8) Arc-rated jacket, parka, or rainwear (AN)
FR Protective Equipment	Hard hat FR hard hat liner (AR) Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Arc-rated gloves (Note 2) Leather work shoes
Hazard/Risk Category 4	
FR Clothing, Minimum Arc Rating of 40 (Note 1)	Arc-rated long-sleeve shirt (AR) (Note 9) Arc-rated pants (AR) (Note 9) Arc-rated coverall (AR) (Note 9) Arc-rated arc flash suit jacket (AR) (Note 9) Arc-rated arc flash suit pants (AR) (Note 9) Arc-rated arc flash suit hood (Note 9) Arc-rated jacket, parka, or rainwear (AN)
FR Protective Equipment	Hard hat FR hard hat liner (AR) Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Arc-rated gloves (Note 2) Leather work shoes

Standard for NFPA 70E Safety Requirements for Employee Workplaces — 2009 Edition.

(Table 130.7 [C] [II] Protective Clothing Characteristics)

HAZARD RISK CATEGORY	CLOTHING DESCRIPTION	MINIMUM ARC RATING (cal/cm ²)	SINGLE LAYER FABRIC OPTIONS
0	Non-melting flammable materials	N/A	UltraSoft® Style 301 Shirt/Coverall & Style 451 Pant/Coverall Meet HRCs 0, 1, & 2. UltraSoft AC™ Style 901 Shirt/Coverall & Style 951 Pant/Coverall Meet HRCs 0, 1, & 2.
1	Arc rated FR Shirt and FR Pants or FR Coverall	4	
2	Arc rated FR Shirt and FR Pants or FR Coverall	8	
3	Arc rated FR Shirt and FR Pants or FR Coverall, and arc flash suit selected so that the system arc rating meets the required minimum	25	
4	Arc rated FR Shirt and FR Pants or FR Coverall, and arc flash suit selected so that the system arc rating meets the required minimum	40	