

ARC FLASH & ELECTRIC SHOCK PERSONAL PROTECTIVE EQUIPMENT

Specification, Selection, Pre-use Inspection & Checks—Based on NFPA 70E-2024



The Safety Tool Specialists

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PPE PRE-USE CHECKS

Arc Flash PPE:

- Natural fiber clothing (e.g. cotton, wool or silk) shall be worn underneath arc-rated PPE.
- Check labeling and confirm ATPV value in cal/cm².
- Proper fit.
- Ensure there are no rips, or tears resulting in holes.
- No contamination with grease, oil, flammable liquids, or combustible liquids to a level that would compromise protection.
- Lens of arc-rated face shields or arc flash suit hoods are not cracked, not scratched excessively and chin and side shields are secured.
- Hard hats are Class E and suspension is not damaged and ensure you tighten the suspension to the head.
- LED lamp is functioning properly.
- Hood ventilation system is functioning properly.
- Arc-rated balaclavas are tucked into the collar of long sleeved shirt or coverall.
- If arc flash PPE is shared, has it been cleaned to manufacturer's instructions and where required disinfected following manufacturer's recommendations.

Electric Shock PPE:

- Rubber insulating gloves visually inspected and air tested before use. Stamped with test date current in the last 6 months.
- Protector gloves - no rips and not excessively soiled.
- Protector gloves - same Class # and size of rubber insulating gloves.
- Rubber insulating gloves shall be stored in a rubber insulating gloves storage bag that is the right length for the Class # of the rubber insulating gloves. Store the rubber insulating gloves with the open end of the rubber insulating glove and protector gloves into the storage bag and palm-to-palm.
- Insulated hand tools shall have approved mark, double stacked triangles, 1000V.
- Insulation on insulated hand tools not scratched or nicked excessively where the yellow underlayer is exposed.
- Hot sticks have been tested within 2 years, are clean with no visible damage and are functioning properly.
- If rubber insulating gloves are shared, the rubber insulating gloves have been cleaned to manufacturer's instructions and, where required, disinfected following manufacturer's recommendations.

Test Instruments:

- For low voltage electrical equipment test instrument is approved for use and minimum CAT III, 600V.
- Test instrument, leads and probes not damaged.
- Test instrument is set to correct measurement setting.
- Test on a known source before and after testing for absence of voltage.

ARC FLASH PPE MINIMUM REQUIREMENTS

ARC-RATING LEVEL 1 8-12 cal/cm²



Body: Everyday/task wear long sleeved shirt/pant or coverall (with storage bag). 100% natural fiber clothing to be worn underneath.

Emergency Rescue: "Escape Strap" vest available for use.

Head & Face: ANSI approved eyewear, clear lens. Arc-rated balaclava and arc-rated face shield (with storage bag) with true color grey lens, ANSI approved Class E hard hat and LED lamp.

Hearing: ANSI approved minimum ear canal insert ear plugs.

Hands: Appropriate Class # of rubber insulating gloves with protectors (with storage bag sized to the Class #).

Footwear: ANSI approved EH rated leather footwear.

Note: Rubber insulating gloves with protectors provide arc flash protection for the hands. Where there is no electric shock hazard exposure heavy duty leather work gloves or specifically tested arc-rated gloves provide arc flash protection for the hands.

ARC-RATING LEVEL 2 Minimum 75, 100 or 140 cal/cm²



Body: Arc flash suit: bib overalls, and jacket with "Escape Strap." 100% natural fiber clothing to be worn underneath. Manufacturer's storage bag.

Emergency Rescue: "Escape strap" can be used.

Head & Face: ANSI approved eyewear, clear lens. Arc flash suit hood with true color grey lens, ANSI approved Class E hard hat, arc flash suit hood ventilation system and LED lamp.

Hearing: ANSI approved minimum ear canal insert ear plugs.

Hands: Appropriate Class # of rubber insulating gloves with protector gloves (with storage bag sized to the Class #).

Footwear: ANSI approved EH rated leather footwear.

Note: Rubber insulating gloves with protectors provide arc flash protection for the hands. Where there is no electric shock hazard exposure heavy duty leather work gloves or specifically tested arc-rated gloves provide arc flash protection for the hands. Arc flash suits are available with an ATPV of up to 140.0 cal/cm² and can be procured for use.

Arc Flash PPE Level	Arc-rating of Arc Flash PPE (ATPV)
1	Minimum 4 cal/cm ² , ESP Level 1 everyday wear/task wear arc flash PPE.
2	Minimum 8 cal/cm ² , ESP Level 1 everyday wear/task wear arc flash PPE.
3	Minimum 25 cal/cm ² , ESP Level 2 arc flash suit.
4	Minimum 40 cal/cm ² , ESP Level 2 arc flash suit. Note: Arc flash suits are available with an ATPV of 140 cal/cm ² .

NFPA 70E-24 Table 130.4(E)(a)

Electric Shock Protection Approach Boundaries to Exposed Energized Electrical Conductors or Circuit Parts for AC Systems

Nominal System Voltage Range - Phase to Phase	Limited Approach Boundary - Exposed Fixed Circuit Part	Restricted Approach Boundary (includes inadvertent movement adder)
≤ 50V	Not Specified	Not Specified
50V - 150V	1.0 m (3 ft. 6 in.)	Avoid Contact
151V - 750V	1.0 m (3 ft. 6 in.)	0.31 m (1 ft. 0 in.)
751V - 5kV	1.0 m (3 ft. 6 in.)	0.63 m (2 ft. 1 in.)
5.1kV - 15kV	1.5 m (5 ft. 0 in.)	0.65 m (2 ft. 2 in.)
15.1kV - 36kV	1.8 m (6 ft. 0 in.)	0.77 m (2 ft. 7 in.)

Class #	Max. Use Voltage AC	Max. Use Voltage DC	Notes
00	500VAC	750VDC	Protector gloves shall be correct Class # and size to match rubber insulating gloves. Storage bag needs to be specified to accommodate glove length, stored flat. Vinyl bag with two pockets recommended. Rubber insulating gloves and protector gloves shall be air and visually inspected before use.
0	1000VAC	1500VDC	
1	7500VAC	11250VDC	
2	17000VAC	25500VDC	
3	26500VAC	39750VDC	
4	36000VAC	54000VDC	

NFPA 70E-24 Table 130.4(E)(b)

Electric Shock Protection Approach Boundaries to Exposed Energized Electrical Conductors or Circuit Parts for DC Systems

Nominal Voltage Conductor to Ground	Limited Approach Boundary Exposed Fixed Circuit Part	Restricted Approach Boundary (includes inadvertent movement adder)
≤ 50V	Not Specified	Not Specified
50V - 300V	1.0 m (3 ft. 6 in.)	Avoid Contact
301V - 1kV	1.0 m (3 ft. 6 in.)	0.3 m (1 ft. 0 in.)
1.1kV - 5kV	1.5 m (5 ft. 0 in.)	0.5 m (1 ft. 5 in.)

DETAILED ARC FLASH & ELECTRIC SHOCK WARNING EQUIPMENT LABEL EXAMPLE

WARNING

Arc Flash and Shock Hazard

ARC FLASH PPE 56.1 cal/cm ² Incident energy	SHOCK PROTECTION 480 VAC
Arc Flash Boundary Working Distance 144 inches Limited Approach Boundary Working Distance 24 inches	RIG Class # 0 Limited Aprch. Boundary 42 inches Restricted Aprch. Boundary 12 inches <small>(FOR EXPOSED ENERGIZED CONDUCTORS or CIRCUIT PARTS)</small>

Equipment: MCC #1 Building, SWGR #1
 Protective Device: LOAD SIDE OF FB-1
 Report #: TWBESC-XXX-YYY-AHA-ZZZ Rev 1.0

Analysis By: TWBESC
 Date: 2021-01-30
 Standard #: IEEE 1584-2018



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