

PPE Recommendations

Low and Medium Voltage Equipment Operation / Maintenance

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Introduction

This document outlines Schneider Electric's recommended level of Personal Protective Equipment (PPE) to use when performing typical operation and maintenance procedures on Square D™ brand low and medium voltage equipment.

Before You Begin

Before performing any of the tasks listed in the table starting, you must be familiar with and follow the requirements contained within NFPA 70E: Standard for Electrical Safety in the Workplace or CSA Z462: Workplace Electrical Safety. In addition, all electrical equipment must be installed in accordance with local and national installation codes and adequately maintained per NFPA 70B: Recommended Practice for Electrical Equipment Maintenance and instructions from Schneider Electric. Failure to follow the safety recommendations can result in death or serious injury, as well as property damage.

Square D equipment manufactured by Schneider Electric is designed, built, and tested to comply with industry standards, including but not limited to the following standards:

- C37.20.1, IEEE Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
- C37.20.2, IEEE Standard for Metal-Clad Switchgear
- C37.20.3, IEEE Standard for Metal-Enclosed Interrupter Switchgear
- C37.20.7, IEEE Guide for Testing Metal-Enclosed Switchgear Rated Up to 38 kV for Internal Arcing Faults
- UL 67, Panelboards
- UL 98, Enclosed and Dead-Front Switches
- UL 845, Motor Control Centers
- UL 891, Switchboards

With the exception of C37.20.7, these standards do not require that equipment be tested for internal arcing faults. Schneider Electric's position is to de-energize equipment to establish an electrically safe work condition prior to working on or inside the equipment. Always follow safety precautions.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- The equipment must be installed and serviced only by qualified electrical personnel.
- NEVER work alone and be sure to follow all safety procedures applicable to site and equipment.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect ALL sources of electric power. Assume all circuits are live until they are completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of back-feeding.
- Always practice lock-out/tag-out procedures according to OSHA requirements.
- Always use a properly rated voltage sensing device to confirm power is off by following NFPA 70E or CSA Z462 guidelines for establishing an electrically safe work condition.
- Circuit breaker and switch contacts must be open and all springs discharged before performing maintenance work, disconnection, or removal of a circuit breaker.
- Conduct electrical testing to confirm no short-circuits were created during installation, maintenance, or inspection.
- Never insert a circuit breaker into a circuit breaker compartment that is not complete and functional.
- Be aware of potential hazards, wear personal protective equipment, and take adequate safety precautions.
- Before replacing covers, closing doors, and turning on equipment, carefully inspect the work area for tools and objects that may have been left inside the equipment.
- When removing or installing panels, be careful not to touch them to energized bus.
- Replace all devices, doors, and covers before turning on power to the equipment.

Failure to follow these instructions will result in death or serious injury.

Recommended PPE Levels

The following table lists the minimum level of PPE to use when performing typical operation and maintenance procedures on common types of Square D™ brand low and medium voltage equipment. For further information on safe work practices, refer to NFPA 70E or CSA Z462.

NOTE: The table addresses operation, maintenance, or other work tasks associated with a variety of electrical equipment. There are instances where qualified or unqualified persons are in the vicinity of enclosed energized equipment, but are not interacting with the equipment in a manner that could cause an electric arc. Without such interaction, enclosed energized equipment that has been properly installed and maintained is not likely to pose an arc flash hazard. The arc flash protection boundary and associated PPE requirements are applicable only when an arc flash hazard exists.

Definition of "Normal Circumstances"

As used in the table, this term describes equipment that has been/has:

- Properly installed, rated, and maintained
- Properly commissioned and tested after installation
- Covers properly in place and secured
- In operation under load for some period of time with no evidence of impending failure.

Equipment	Task	Minimum PPE Level
Power-Zone 4 Switchgear, and Switchboards	First time energizing or start up of the equipment, or after completion of work or maintenance on the equipment or in the circuit breaker cubicle.	PPE should be worn per the incident energy level determined at that point in the system.
	Racking of circuit breakers; removal and installation of circuit breakers.	
	"Normal" operation (open/close) of circuit breakers with doors closed and covers securely in place.	Under normal circumstances, arc-rated clothing is not required for these tasks. Non-melting natural fibers such as cotton, wool, or rayon (or blends of these materials) are recommended. See definition of normal circumstances preceding this table.
	Closed door interaction with externally mounted meters and displays.	
Power-Style QED-2 Switchboards, Panelboards, and Safety Switches	First time energizing or start up of the equipment, or after completion of work or maintenance on the equipment or in the circuit breaker cubicle.	PPE should be worn per the incident energy level determined at that point in the system.
	Operation (open/close), removal, or installation of circuit breakers with doors or covers open.	
	"Normal" operation (open/close) of circuit breakers or switches with all doors closed and covers securely in place. (This includes normal operation after completion of work or maintenance on separate downstream equipment.) ¹	Under normal circumstances, arc-rated clothing is not required for these tasks. Non-melting natural fibers such as cotton, wool, or rayon (or blends of these materials) are recommended. See definition of normal circumstances preceding this table.
	Closed door interaction with externally mounted meters and displays.	
Model 6 Motor Control Centers (MCCs)	First time energizing or start up of the equipment, or after completion of work or maintenance on the equipment or in the circuit breaker cubicle.	PPE should be worn per the incident energy level determined at that point in the system.
	Racking, removal, or installation of circuit breakers, individual units or "buckets" in an MCC.	
	Normal operation (open/close) of circuit breakers or switches with all doors and covers closed and secured. (This includes normal operation after completion of work or maintenance on separate downstream equipment.)	Under normal circumstances, arc-rated clothing is not required for these tasks. Non-melting natural fibers such as cotton, wool, or rayon (or blends of these materials) are recommended. See definition of normal circumstances preceding this table.
	Closed door interaction with externally mounted meters and displays.	
Medium Voltage Equipment (HVL™, HVL/CC™)	First time energizing or start up of the equipment, or after completion of work or maintenance on the equipment or in the circuit breaker cubicle.	PPE should be worn per the incident energy level determined at that point in the system.
	Racking, removal, or installation of circuit breakers; or open door operation (open/close) of circuit breakers or switches.	
	Normal operation (open/close) of circuit breakers or load interrupter switches with all doors and covers closed and secured.	Under normal circumstances, arc-rated clothing is not required for these tasks. Non melting natural fibers such as cotton, wool, or rayon (or blends of these materials) are recommended. See definition of normal circumstances preceding this table.
	Closed door interaction with externally mounted meters and displays.	

1. Some panelboards and NEMA Type 3R switchboards may require doors to be open for circuit breaker operation. However, all covers (or deadfronts) should be in place and secured.

Equipment	Task	Minimum PPE Level
Passive arc resistant equipment, including arc resistant Masterclad, Model 6 MCC, and PZ4 switchgear. Tested in accordance with IEEE C37.20.7, Type 1 or 2, and properly rated and installed in accordance with instructions.	Insertion or removal of circuit breakers with equipment doors open.	PPE should be worn per the incident energy level determined at that point in the system.
	Insertion or removal of ground and test device with equipment doors open.	
	Insertion or removal of voltage transformers on or off the bus with equipment doors open.	
	Performing maintenance activities and tasks other than those outlined in this table.	
	Normal operation (open/close) of circuit breakers with all doors closed and covers securely in place. ²	Under normal circumstances, arc-rated clothing is not required for these tasks. Non-melting natural fibers such as cotton, wool, or rayon (or blends of these materials) are recommended. See definition of normal circumstances preceding this table.
	Closed door interaction with externally mounted meters and displays.	
	Racking of circuit breakers with equipment doors closed.	
	Racking of ground and test device with equipment doors closed.	
Racking of voltage transformers on or off the bus with equipment doors closed.		
Medium Voltage Masterclad Equipment with Arc Terminator active arc extinguishing system. Tested in accordance with IEEE C37.20.7, Type 1 or 2 and properly rated and installed in accordance with instructions.	First time energizing or start up of the equipment, or after completion of work or maintenance on the equipment or in the circuit breaker cubicle.	PPE should be worn per the incident energy level determined at that point in the system excluding the effect of the arc terminator on arc duration.
	Racking, removal, or installation of circuit breakers; or open door operation (open/close) of circuit breakers or switches.	
	Normal operation (open/close) of circuit breakers or load interrupter switches with all doors and covers closed and secured.	Under normal circumstances, arc-rated clothing is not required for these tasks. Non melting natural fibers such as cotton, wool, or rayon (or blends of these materials) are recommended. See definition of normal circumstances preceding this table.
	Closed door interaction with externally mounted meters and displays.	

2. Some NEMA Type 3R MCCs may require external enclosure doors to be open for circuit breaker operation. However, all internal enclosure covers (or deadfronts) should be in place and secured.