

# NFPA 70E COMPLIANCE GUIDE

This guide shall only be used in conjunction with performing the necessary calculations contained in a flash hazard analysis to determine the proper cal/cm<sup>2</sup>. If the results of the calculations exceed the cal/cm<sup>2</sup> that correspond to the HRC found on this guide, you must use clothing that complies with the calculation.

Panelboards Rated 240 V and Below - Notes 1 and 3				600 V Class Switchgear (with power circuit breakers or fused switches) - Notes 5 and 6				NEMA E2 (fused contactor) Motor Starters, 2.3 kV through 7.2 kV			
TASK (equipment is energized & work is done within the flash protection boundary)	V-Rated Gloves	V-Rated Tools	HRC	TASK (equipment is energized & work is done within the flash protection boundary)	V-Rated Gloves	V-Rated Tools	HRC	TASK (equipment is energized & work is done within the flash protection boundary)	V-Rated Gloves	V-Rated Tools	HRC
Circuit Breaker (CB) or fused switch operation with covers on			0	CB or fused switch operation with enclosure doors closed			0	Contactor operation with enclosure doors closed			0
CB or fused switch operation with covers off			0	Reading a panel meter while operating a meter switch			0	Reading a panel meter while operating a meter switch			0
Opening hinged covers (to expose bare, energized parts)			0	Work on control circuits with energized parts 120 V or below, exposed	Y	Y	0	Work on control circuits with energized parts 120 V or below, exposed	Y	Y	0
Removal of bolted covers (to expose bare, energized parts)			1	CB or fused switch operation with enclosure doors open			1	Insertion or removal (racking) of starters from cubicles, doors closed			2
Remove or Install CB's or fused switches	Y	Y	1	Insertion or removal (racking) of CB's from cubicles, doors closed			2	Contactor operation with enclosure doors open			2 *
Work on energized parts, including voltage testing	Y	Y	1	Opening hinged covers (to expose bare, energized parts)			2	Insertion or removal (racking) of starters from cubicles, doors open			3
<b>Panelboards / Switchboards Rated 240 V to 600 V (with molded case or insulated case CB's) - Notes 1 &amp; 3</b>				<b>Other 600 V Class (277 V to 600 V, nominal) Equipment - Lighting or small power transformers (600V Max) - Note 3</b>				<b>Metal Clad Switchgear, 1 kV and Above</b>			
TASK (equipment is energized & work is done within the flash protection boundary)	V-Rated Gloves	V-Rated Tools	HRC	TASK (equipment is energized & work is done within the flash protection boundary)	V-Rated Gloves	V-Rated Tools	HRC	TASK (equipment is energized & work is done within the flash protection boundary)	V-Rated Gloves	V-Rated Tools	HRC
CB or fused switch operation with covers on			0	Opening hinged covers (to expose bare, energized parts)			1	Reading a panel meter while operating a meter switch			0
CB or fused switch operation with covers off			1	Removal of bolted covers (to expose bare, energized parts)			2 *	CB or fused switch operation with enclosure doors closed			2
Work on energized parts, including voltage testing	Y	Y	2 *	Application of safety grounds, after voltage test	Y		2 *	Work on control circuits with energized parts 120 V or below, exposed	Y	Y	2
<b>600 V Class Motor Control Centers (MCC's) - Notes 2 (except as indicated) and 3</b>				<b>Other 600 V Class (277 V to 600 V Nom.) Equip - Revenue meters (kWH at primary voltage &amp; current) - Note 3</b>				<b>Other Equipment 1 kV and Above - Metal clad load interrupter switches, fused or unfused</b>			
TASK (equipment is energized & work is done within the flash protection boundary)	V-Rated Gloves	V-Rated Tools	HRC	TASK (equipment is energized & work is done within the flash protection boundary)	V-Rated Gloves	V-Rated Tools	HRC	TASK (equipment is energized & work is done within the flash protection boundary)	V-Rated Gloves	V-Rated Tools	HRC
CB or fused switch or starter operation with enclosure doors closed			0	Cable trough or tray cover removal or installation			1	Switch operation, doors closed			2
Reading a panel meter while operating a meter switch			0	Miscellaneous equipment cover removal or installation			1	Outdoor disconnect switch operation (gang-operated, from grade)			2
Work on control circuits with energized parts 120 V or below, exposed	Y	Y	0	Application of safety grounds, after voltage test	Y		2 *	Insulated cable exam, in open area	Y		2
CB or fused switch or starter operation with enclosure doors open			1	Insertion or removal	Y		2 *	Opening hinged covers (to expose bare, energized parts)			3
Opening hinged covers (to expose bare, energized parts)			1	Work on energized parts, including voltage testing	Y	Y	2 *	Outdoor disconnect switch operation (hookstick operated)	Y	Y	3
Removal of bolted covers (to expose bare, energized parts)			2 *	<b>Minimum Clothing Requirements</b>				Removal of bolted covers (to expose bare, energized parts)			4
Application of safety grounds, after voltage test	Y		2 *	<b>HRC</b>	<b>Protective Clothing</b>		<b>Minimum Cal/cm<sup>2</sup></b>	<b>PPE (Safety glasses, leather safety shoes required for all)</b>			4
Work on energized parts, including voltage testing	Y	Y	2 *	-1	Natural fiber short-sleeved shirt and long pants		N/A	Hard Hat			4
Work on control circuits with energized parts >120 V exposed	Y	Y	2 *	0	Natural fiber long-sleeved shirt and pants		N/A	Hard hat			4
Insertion or removal of individual starter "buckets" from MCC - Note 4	Y		3	1	Denim jeans and FR long-sleeved shirt OR FR long-sleeved shirt and pants OR FR coveralls		4	Hard Hat, Arc-Rated Face Shield*			4
				2	FR long-sleeved shirt and pants OR FR coveralls		8	Hard Hat, Arc-Rated Face Shield			4
				2 *	FR long-sleeved shirt and pants OR FR coveralls		8	Hard Hat, Hearing Protection, Arc-Rated Face Shield and 8 cal/cm <sup>2</sup> + Stocking Hood* OR Multi-Layer Switching Hood			4
				3	Multi-Layer flash suit over FR long-sleeved shirt and pants over natural fiber short-sleeved T-shirt and pants OR Multi-Layer flash suit over FR coveralls over natural fiber short-sleeved T-shirt and pants		25	Hard Hat, Multi-Layer Switching Hood, Hearing Protection, OR Arc-rated Goggle and Stocking Hood*			4
				4	Multi-Layer flash suit over FR long-sleeved shirt and pants over natural fiber short-sleeved T-shirt and pants OR Multi-Layer flash suit over FR coveralls over natural fiber short-sleeved T-shirt and pants		40	Hard Hat, Multi-Layer Switching Hood, Hearing Protection, OR Arc-rated Goggle and Stocking Hood*			4

HRC	Protective Clothing	Minimum Cal/cm <sup>2</sup>	PPE (Safety glasses, leather safety shoes required for all)
-1	Natural fiber short-sleeved shirt and long pants	N/A	Hard Hat
0	Natural fiber long-sleeved shirt and pants	N/A	Hard hat
1	Denim jeans and FR long-sleeved shirt OR FR long-sleeved shirt and pants OR FR coveralls	4	Hard Hat, Arc-Rated Face Shield*
2	FR long-sleeved shirt and pants OR FR coveralls	8	Hard Hat, Arc-Rated Face Shield
2 *	FR long-sleeved shirt and pants OR FR coveralls	8	Hard Hat, Hearing Protection, Arc-Rated Face Shield and 8 cal/cm <sup>2</sup> + Stocking Hood* OR Multi-Layer Switching Hood
3	Multi-Layer flash suit over FR long-sleeved shirt and pants over natural fiber short-sleeved T-shirt and pants OR Multi-Layer flash suit over FR coveralls over natural fiber short-sleeved T-shirt and pants	25	Hard Hat, Multi-Layer Switching Hood, Hearing Protection, OR Arc-rated Goggle and Stocking Hood*
4	Multi-Layer flash suit over FR long-sleeved shirt and pants over natural fiber short-sleeved T-shirt and pants OR Multi-Layer flash suit over FR coveralls over natural fiber short-sleeved T-shirt and pants	40	Hard Hat, Multi-Layer Switching Hood, Hearing Protection, OR Arc-rated Goggle and Stocking Hood*

Note 7 ASTM Recommendations are noted with the \*

TASK (equipment is energized & work is done within the flash protection boundary)	V-Rated Gloves	V-Rated Tools	HRC
Switch operation, doors closed			2
Outdoor disconnect switch operation (gang-operated, from grade)			2
Insulated cable exam, in open area	Y		2
Opening hinged covers (to expose bare, energized parts)			3
Outdoor disconnect switch operation (hookstick operated)	Y	Y	3
Removal of bolted covers (to expose bare, energized parts)			4
Insulated cable examination, in manhole or other confined space	Y		4
Work on energized parts, including voltage testing	Y	Y	4

**\* If the notes cannot be satisfied, work must be performed de-energized.**

Note 1 Maximum of 25 kA short circuit current available, 0.03 second (2 cycle) fault clearing time.  
 Note 2 Maximum of 65 kA short circuit current available, 0.03 second (2 cycle) fault clearing time.  
 Note 3 For < 10 kA short circuit current available, the HRC required may be reduced by one category.  
 Note 4 Maximum of 42 kA short circuit current available, 0.33 second (20 cycle) fault clearing time.  
 Note 5 Maximum of 35 kA short circuit current available, ≤ 0.5 second (30 cycle) fault clearing time.  
 Note 6 For < 25 kA short circuit current available, the HRC required may be reduced by one category.  
 \*Circuits over 40cal/cm<sup>2</sup> should only be worked de-energized.

**Definitions: Y=Yes (Required)**

**V-Rated Gloves :** gloves rated and tested for the maximum line-to-line voltage upon which work will be done. Leather protectors must be worn externally if v-rated rubber gloves could be damaged.

**V-Rated Tools :** tools rated and tested for the maximum line-to-line voltage upon which work will be done.

**HRC :** Hazard Risk Category      **FR :** Flame Resistant