

DRAFT ARC FLASH POLICY

vermont electric power company



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What is NFPA 70E?

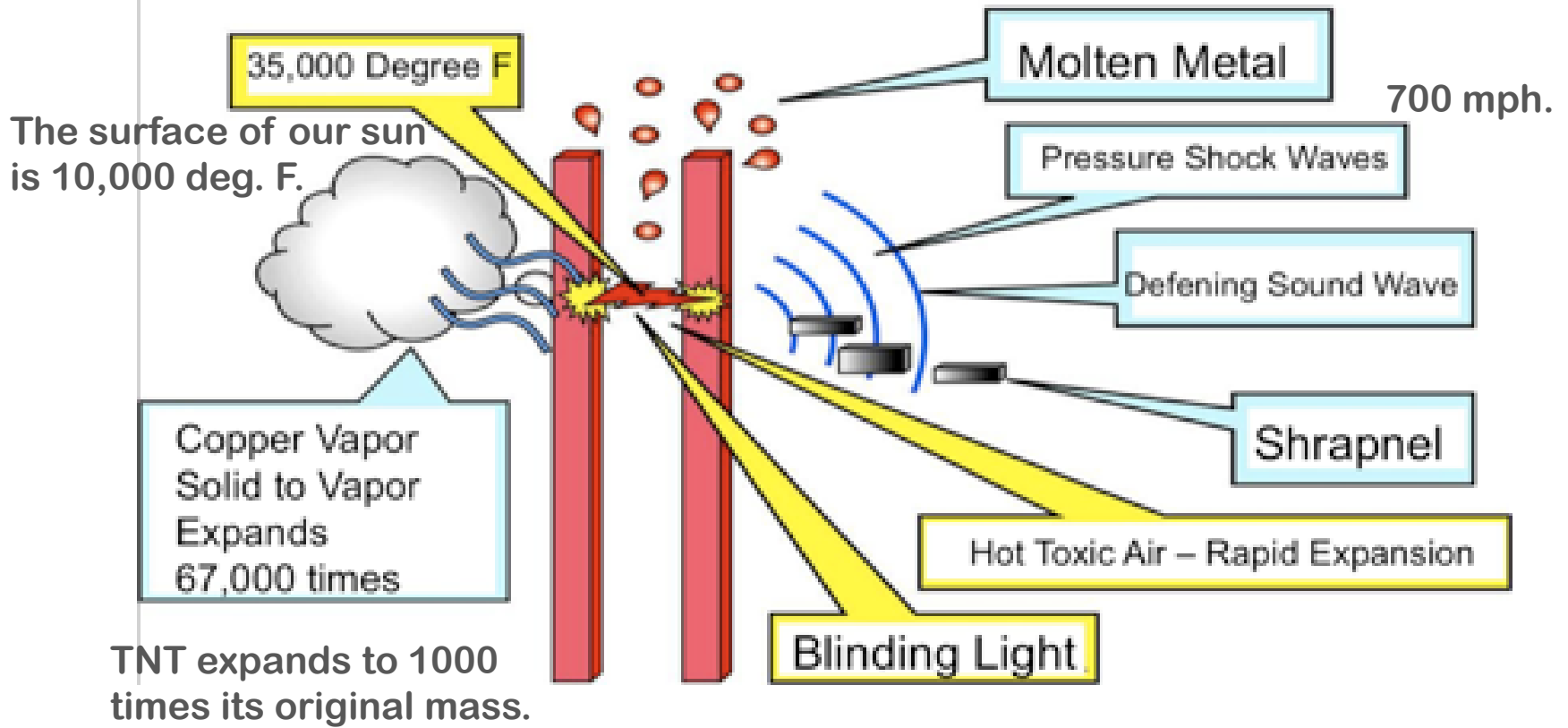
NFPA 70E requirements for safe work practices to protect personnel by reducing exposure to major electrical hazards. Originally developed at OSHA's request, NFPA 70E helps companies and employees avoid workplace injuries and fatalities due to shock, electrocution, arc flash, and arc blast, and assists in complying with OSHA 1910 Subpart S and OSHA 1926 Subpart K.

What is OSHA 29 CFR 1910 Subpart S?

OSHA's goal is for employers to identify all electrical hazards, both potential and actual. In the past, OSHA focused on process changes, encouraging companies to de-energize circuits before working on them, perform lockout/tagout procedures and develop ongoing safety programs that include worker training and retraining. A more recent area of emphasis is arc flash safety, which means electrical safety professionals must analyze the workplace for shock and arc flash hazards, establish safe protection boundaries and define what personal protective equipment (PPE) must be used within these boundaries.

WHAT IS AN ARC FLASH?

Electrical Arc



VELCO's engineering department conducted an arc flash study, identifying the potential Incident Energy Exposure levels at all manually operated switches and disconnects, in all of our substations. Analysis revealed that three distinct levels of PPE, combined with distance from the device being operated, would be sufficient personal protection at all locations in the VELCO system.

Incident Energy	PPE Level	PPE Includes
<8 calories per cm ²	LOW	Standard FR, switching jacket, shield, safety glasses.
>8, <12 calories per cm ²	MEDIUM	All the above plus the balaclava.
>12 calories per cm ²	HIGH	Hood replaces shield and balaclava.

HV Switching Results Over 15kV

Incident Energy Exposure Over 8 cal/cm²

Substation	Arc Duration (cycles)	Minimum Distance to get under 8 cal/cm ²	Incident Energy at Distance to Arc (cal/cm ²)	Switches	Additional PPE
Ascutney	67	125	15.27	4SF, 7PF	Hood or Distance
Ascutney	67	125	12.06	709	Hood or Distance
Ascutney	68	120	9.284	15-8, 1574-8, 150, 15-1/2 (Crank handles)	Balaclava
Barre	120	110	11.088	6CF	Balaclava or Distance
Barre	120	110	9.966	049, 069, 639, 3SF, 7PF	Balaclava or Distance
Coolidge	9	65	10.648	91-6, 94-6 (Crank handles)	Balaclava
Essex	84	120	12.188	209, 219, 8PF	Hood or Distance
Granite	56	145	14.410	54-1/2 (Crank handle)	Hood
Highgate	120	130	9.614	41-1/2 (Crank handle)	Balaclava
Highgate	120	110	9.482	207, 208, 247, 248	Balaclava or Distance
Jay	120	110	9.658	109, 7PF, 119, 8PF	Balaclava or Distance
Middlebury	120	100	9.482	419, 429, 729, 3SF, 7PF, 418	Balaclava or Distance
New Haven	120	110	12.188	448	Hood or Distance
New Haven	120	110	8.822	44PF	Balaclava or Distance
Stowe	120	90	14.608	32PF, 33PF	Hood or Distance
Stowe	120	90	8.558	337, 358	Balaclava or Distance
Vernon	9	130	9.482	3T1-7, 3T1-8 (Crank handles)	Balaclava
Vernon	8	120	8.426	379-7, 379-8, 379-9, 3R10-7, 3R10-8, 3R10-9, 381-7, 381-8, 381-9, 3381-7, 3381-8, 3381-9, 340-7, 340-8, 340-9, 3320-7, 3320-8, 3320-9, 3340-7, 3340-8, 3340-9, 3T1-9 (Crank handles)	Balaclava
Windsor	120	100	8.712	219, 229, 789, 3SF, 7PF	Balaclava or Distance

Distances are in inches, 10.5' feet of stick from the front hand to the end of the stick puts the switchman outside the 8 calorie boundary.



Face Shield and Hard Hat,
12 Calorie

Safety Glasses, ANSI Z87.1
Compliant

Balaclava Head Cover,
11 Calorie

Switching Jacket, 16 Calorie

Rubber Gloves, Protectors

FR Pants, HRC1 Rating

Boots, Steel Toe

Switching at this
substation requires the
following protective
equipment, as
illustrated above:

Orange hard hat with
face shield, FR
balaclava (head sock),
safety glasses,
switching jacket, FR
pants, steel toe boots,
and rubber gloves.

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Each substation will have a pictogram sign, hanging at the switching station in the control house. This one illustrates typical medium level PPE.

The low level PPE is the same gear minus the balaclava, the high level PPE substitutes the 40 cal hood for the shield and balaclava.



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12 Calorie

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Compliant

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**Switching at this
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**The 16 Calorie Arc Flash rated jacket is an integral part of all three levels of switching PPE at VELCO sites. Any long sleeve outer garment with the equivalent or better rating may be substituted.
Ex: Winter FR coat**



12 Calorie hard hat and face shield assembly, required for switching at all VELCO facilities, also for grounding in substations and grounding lines.



**11 Calorie
Balaclava
provides an
additional level of
protection
necessary when
switching in
locations with our
second highest
calculated level of
incident energy
exposure.
(Medium)**



40 Calorie Hood provides the highest level of protection called for at select locations in our system.

These specific switches will be placarded, informing the switchman that the hood is required.

Questions?