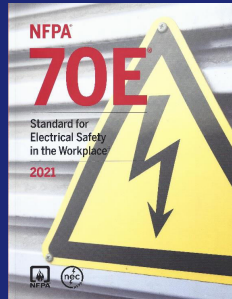


NFPA 70E (Electrical Safety) Implementing a Job Safety Plan



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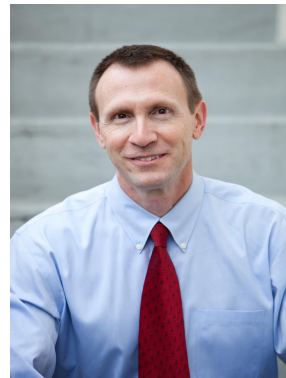


Online Evaluation



Speaker Bio

- Nationally recognized consultant in the area of electrical safety.
- Expert advice in the areas of management and engineering control of electrical hazards for organizations nationwide.
- Advise organizations in the areas of engineering electrical hazard control, written electrical safety program development, and training.



Presentation Format

- Questions starting with IS, WILL, etc.?
- Answer YES or NO.
- 10 steps will be identified for Job Safety Plan Implementation.
- Other requirements.



Presentation Format

- An arc flash label should contain arc flash incident energy and corresponding incident energy, arc flash boundary, and voltage

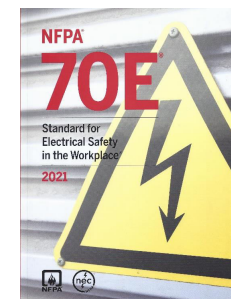
Yes or No

- Answer: Yes, arc flash labels should contain all of this information.

Warning			
Arc-Flash and Shock Risk Appropriate PPE Required			
Flash Protection		Shock Protection	
Incident Energy	8 cal/cm ²	480	VAC Shock Hazard When Covers Removed or door open
Flash Protection Boundary	3' 0"	Limited Approach	3' 6"
PPE	Restricted Approach		
Arc Rated Long Sleeve Shirt, Arc Rated Long Pants, Arc Rated Face Shield, Balaclava head sock, Safety Glasses, Hard Hat, Ear Plugs, Leather footwear.		PPE: Class	00
		Voltage rated gloves with Leather Protectors	

What does NFPA 70E require?

- Before starting each job that involves exposure to electrical hazards:
 - Complete a job safety plan in accordance with the following
 - Completed by a qualified person (one who performs energized work).
 - Documented.
 - NFPA 70E-Article 110.5(I), page 16



What does NFPA 70E require?

- Job Safety Plan includes the following:
 - Description of job & tasks.
 - Hazards associated with tasks.
 - Shock risk assessment.
 - Arc flash risk assessment.
 - Work procedures.



What does NFPA 70E require?

- Information that is needed to develop a job safety plan includes:
 - Voltage levels
 - Arc flash information
 - Task to be performed

- Answer: Yes, all of this information is necessary to determine extent of risk.

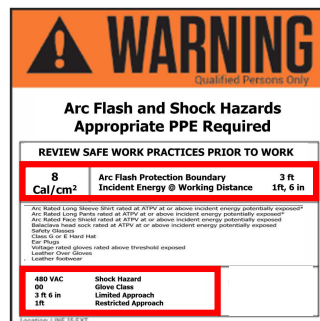


What does NFPA 70E require?

TASK	Equipment Condition	Likelihood of Occurrence
Operation of a CB or switch	Normal	No
Work on energized electrical conductors, including voltage testing	Any	Yes

TASK=NFPA 70E-Table 130.5(C)

VOLTAGE + ARC FLASH=
Arc Flash Label



What does NFPA 70E require?

- NFPA 70E PPE Category Tables provide alternate arc flash energy information in lieu of the arc flash label, however certain parameters must be met.

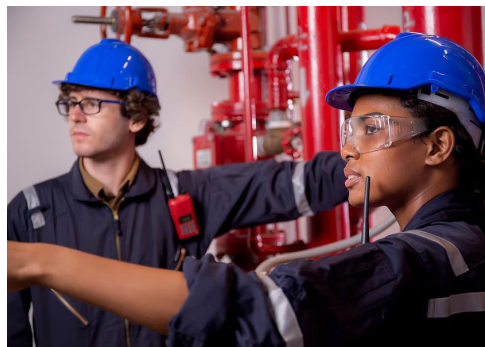
- Clearing time
- Short circuit current

Equipment	Arc Flash PPE Category	Arc Flash Boundary
Panelboards \leq 240 V	1	19 in
Panelboards >240-600 V	2	3 ft



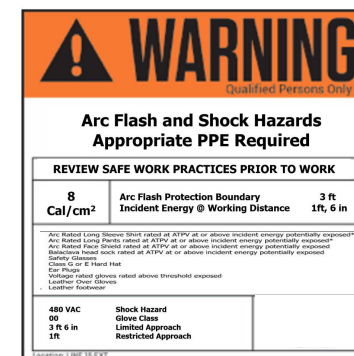
Scenario

- A 480 V motor control circuit is malfunctioning, and troubleshooting is required to determine the cause.
- Because the circuit powers an emergency system, repairs may have to be performed while energized.



Scenario

- The 480 V motor control circuit had an incident energy analysis performed on the system.
- An arc flash label identifies energy/consequence levels.



Job Safety Plan Components

1

Energized Work
Justification

- Is there justification for energized work?
- **REMEMBER DE-ENERGIZING IS FIRST CONSIDERATION!**
 - Additional hazard or increased risk?
 - Ventilation system interruption.
 - Emergency alarm deactivation.
 - Interruption of life support equipment.
 - Infeasible?
 - Testing/troubleshooting/LOTO verification.

• Answer: Yes, shutting off power would result in deactivation of an emergency alarm.



Job Safety Plan Components

2

Exposure

- Will worker be exposed to energized parts?
- Will there be contact with an energized conductor?
 - Work inside the restricted approach boundary.
 - This is typically 1 foot for low voltage.

• Answer: Yes, troubleshooting will involve contact work with a multimeter.

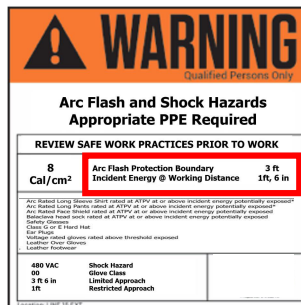


Job Safety Plan Components

3

Arc Flash Hazard

- Is there an arc flash hazard?
- Use equipment arc flash information.
- Working distance is indicated.



• Answer: Yes, arc flash label indicates thresholds above levels for protection.



Job Safety Plan Components

4

Arc Flash Risk
Assessment

Likelihood of Occurrence of Harm	Severity of Harm	
	Energy ≤ 1.2 cal/cm ² ≤ 50 V	Energy > 1.2 cal/cm ² > 50 V
No	Low	Medium
Yes	Medium	High

Arc flash label indicated energy levels above thresholds.

Task table in NFPA 70E indicated arc flash occurrence is likely.



Job Safety Plan Components

4

Arc Flash Risk Assessment

- Did arc flash risk assessment reveal additional protective measures?

Likelihood of Occurrence of Harm	Severity of Harm	
	Energy ≤ 1.2 cal/cm ² ≤ 50 V	Energy > 1.2 cal/cm ² > 50 V
No	Low	Medium
Yes	Medium	High

- Answer: Yes, risk assessment indicated high risk, therefore risk levels must be reduced.

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Job Safety Plan Components

5

Shock Hazard Information

- Is shock level information identified?
- Use equipment arc flash information.
- Or use table 130.4 in NFPA 70E.

WARNING
Qualified Persons Only

**Arc Flash and Shock Hazards
Appropriate PPE Required**

REVIEW SAFE WORK PRACTICES PRIOR TO WORK

8 Cal/cm ²	Arc Flash Protection Boundary Incident Energy @ Working Distance	3 ft 1ft, 6 in
-----------------------	---	-------------------

Arc Rated Long Sleeve Shirt rated at ATPV at or above incident energy potentially exposed*
Arc Rated Long Pants rated at ATPV at or above incident energy potentially exposed*
Arc Rated Face Shield rated at ATPV at or above incident energy potentially exposed*
Balaclava Head sock rated at ATPV at or above incident energy potentially exposed*
Safety Glasses
Safety Helmet
Class G or E Hard Hat
Ear Plugs
Voltage rated gloves rated above threshold exposed
Leather Over Gloves
Leather Footwear

480 VAC 00	Shock Hazard Glove Class
1ft	Restricted Approach

Location: LINE 15 EXT

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- Answer: Yes, arc flash label indicates shock information or use NFPA 70E table 130.4.

Job Safety Plan Components

6

Shock Protective Equipment

- Will restricted approach boundary be crossed (usually 1 foot for low voltage)
- Have voltage rated gloves been identified?
- Have insulated tools been identified?



- Answer: Yes, worker will cross the restricted approach boundary & need voltage rated gloves and possibly tools.

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Job Safety Plan Components

7

Arc Flash Protective Equipment Identification

- Do you have information to identify arc rated equipment?
- Table 130.5(G) in NFPA 70E gives guidance.

WARNING
Qualified Persons Only

**Arc Flash and Shock Hazards
Appropriate PPE Required**

REVIEW SAFE WORK PRACTICES PRIOR TO WORK

8 Cal/cm ²	Arc Flash Protection Boundary Incident Energy @ Working Distance	3 ft 1ft, 6 in
-----------------------	---	-------------------

Arc Rated Long Sleeve Shirt rated at ATPV at or above incident energy potentially exposed*
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Balaclava Head sock rated at ATPV at or above incident energy potentially exposed*
Safety Glasses
Safety Helmet
Class G or E Hard Hat
Ear Plugs
Voltage rated gloves rated above threshold exposed
Leather Over Gloves
Leather Footwear

480 VAC 00	Shock Hazard Glove Class
3 ft 6 in 1ft	Limited Approach Restricted Approach

Location: LINE 15 EXT

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- Answer: Yes, arc flash label arc rated equipment based on incident energy & working distance.

Job Safety Plan Components

8

Arc Flash Protective
Equipment
Implementation

- Have you implemented arc rated equipment?



- Answer: Yes, according to risk assessment you can implement arc rated equipment, in this case at 8 cal/cm² arc rated clothing & face protection.

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Job Safety Plan Components

9

Energy Sources

- Have energy sources been identified?
 - Location for lockout?
 - Voltage measuring?



- Answer: Yes, as a result of job planning, electrical disconnects had been identified.

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Job Safety Plan Components

10

Work Procedures/
Special Precautions

- Are there any special precautions needed to safely complete the task?
 - LOTO procedures?
 - Capacitors?

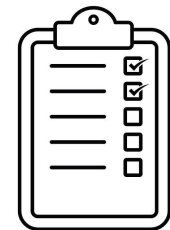


- Answer: Yes, special training is required on the multimeter that will be used for the task.

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What else does NFPA 70E require?

- Job Briefing
 - Components of job safety plan
 - Work permit (if required)
 - **NFPA 70E-Article 110.5(I)(2), page 17**



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What else does NFPA 70E require?

- Are the requirements for job briefing similar to job hazard analysis/job safety analysis?

• Answer: Yes, job briefing should be a checklist ensuring safety requirements have been met.



Job Briefing Components

- Voltages.
- Shock & arc flash boundaries.
- Abnormal operating conditions (such as equipment compromise).
- Emergency procedures.
 - Shut offs
 - Standby person for CPR/AED
 - Phone
 - Fire alarm
 - Fire extinguisher

JOB BRIEFING	
To be completed before beginning energized work.	
Equipment Location:	_____
Date Evaluated:	_____
Evaluated by:	_____
Equipment Location/Description:	_____
Voltage:	_____
Identify	
<input type="checkbox"/> Hazards identified? <input type="checkbox"/> Voltage levels involved identified? <input type="checkbox"/> Any unusual work conditions identified? <input type="checkbox"/> Shock protection boundaries identified? <input type="checkbox"/> Available accident energy determined? <input type="checkbox"/> Potential for arc flash (Conduct as per flash risk assessment). <input type="checkbox"/> Arc flash boundary identified? <input type="checkbox"/> Any evidence of equipment failure? <input type="checkbox"/> Can the equipment be de-energized? <input type="checkbox"/> Is no energized electrical work permit required? <input type="checkbox"/> Is a standby person present?	
Emergency	
<input type="checkbox"/> Is the standby person CPR/AED trained? <input type="checkbox"/> Is the required emergency equipment available? Where is it? <input type="checkbox"/> Where is the nearest telephone?	



Permit Components

- Does NFPA 70E exempt work permit for certain operations?

• Answer: Yes, testing & troubleshooting and non-contact work operations where restricted approach boundary is not crossed are exempted.



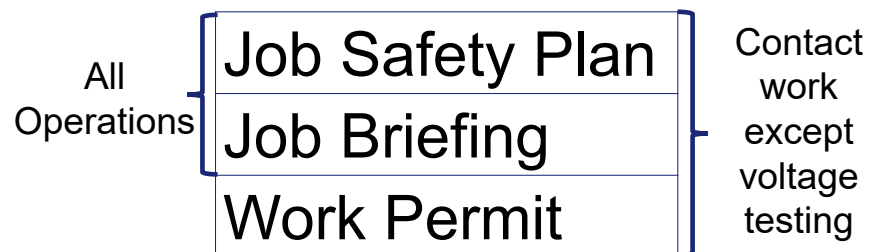
Permit Components

- Energized Electrical Work Permit
 - Determination of shock protection boundaries
 - Results of Flash Incident Energy Analysis
 - Arc Flash Boundaries
 - PPE
 - Means employed to restrict access of unqualified persons to persons working in area
- Job Briefing
- Approvals
 - Work outside Restricted Approach Boundary
 - Voltage Testing & Troubleshooting
- NFPA 70E, Article 130.2(A)(B)(C)

ENERGIZED ELECTRICAL WORK PERMIT	
Complete this form before work is started on all live electrical equipment (unless exempt)	
PART I: TO BE COMPLETED BY PERSON REQUESTING WORK	
Building Name _____	Date _____
Requester _____	Identification # _____
Work to be performed: _____	
Justification of why circuit/equipment cannot be de-energized: _____	
PART II: TO BE COMPLETED BY LEAD QUALIFIED PERSON PERFORMING WORK	
Qualified Persons Involved: 1. _____ (Employee in charge)	
2. _____	
3. _____	
a. Purpose of task	_____
b. Qualification and number of employees involved	_____
c. Approach limits	_____
1. Qualified Person Minimum Working Distances	_____
2. Flash Protection Boundaries	_____
d. Other safe work practices, which will be used (i.e., location of emergency shut off)	_____
e. PPE to be used	Incident energy: _____ cal/cm ² at _____ inches
	Voltage Rated Gloves: 00 0 1 2 3 4
f. Insulating materials/tools to be used	Voltage Rated Tools: Y N
g. Job Briefing Completed	Yes No
III. APPROVALS TO PERFORM WORK WHILE ENERGIZED	
Signature-Requester _____	Date _____
Signature-Qualified Person _____	Date _____
Signature-Safety Manager _____	Date _____
Signature-Contractor Safety Manager _____	Date _____



Summary



Summary/Job Safety Plan

- ☒ Is energized work justified?
- ☒ Will worker be exposed to energized parts?
- ☒ Is there an arc flash hazard?
- ☒ Did arc flash risk assessment reveal additional protective measures?
- ☒ Is shock level information identified?
- ☒ Will restricted approach boundary be crossed (usually 1 foot for low voltage)
- ☒ Do you have information to identify arc rated equipment?
- ☒ Have you implemented arc rated equipment?
- ☒ Are there any special precautions needed to safely complete the task?



Summary

Component	NFPA 70E Location
Job Safety Plan	Annex I.2
Job Briefing	Annex I.1
Work Permit	Annex J



Summary

QUESTIONS??



Please complete the Online Evaluation

