NFPA 70E PPE Best Practices

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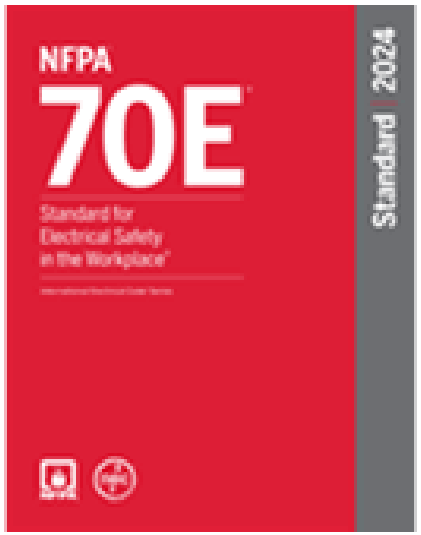
READY FOR THE WORKDAY®



What's new in 2024 and Core Principles of the

Our Agenda

Understanding the Hazards

2024 Edition Key Updates

Risk Assessments the Why

Comprehensive NFPA 70E Program

Difference Non-FR vs FR

Proper PPE and Options

Care, Maintenance, & Proper Use

Best Practices

Conclusions & Next Steps

Questions

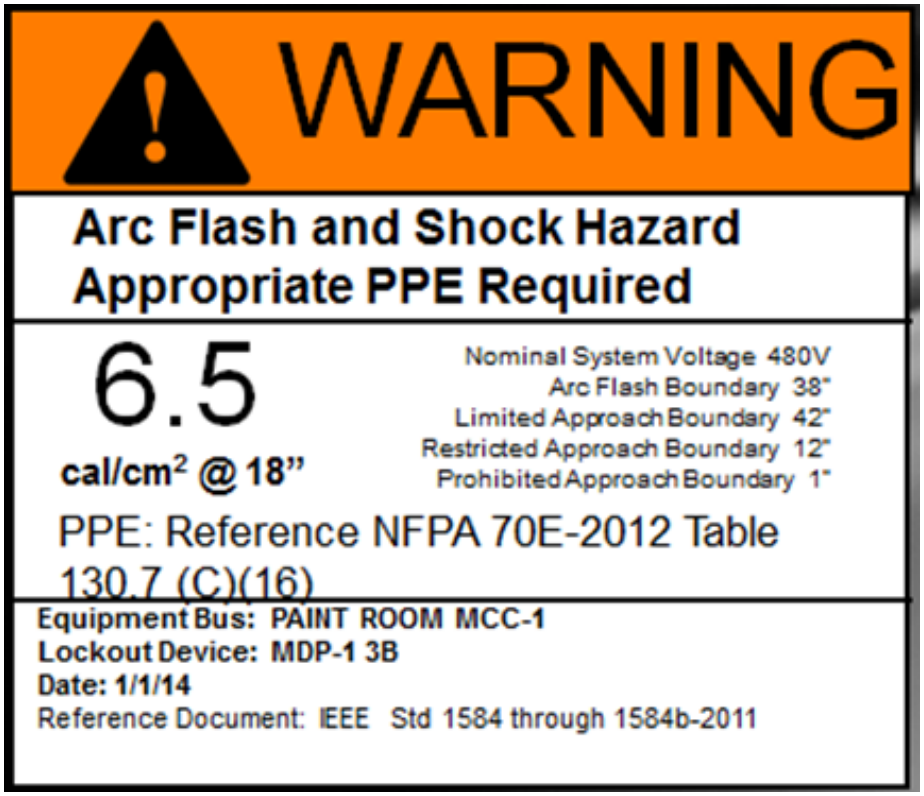
Respecting and Understanding the Hazards

Arc Flash Hazard:

A dangerous condition associated with the possible **release** of energy caused by an electric arc.

Shock Hazard:

A dangerous condition associated with the possible release of energy caused by **contact** or approach to energized electrical conductors or circuit parts.



Not IF, but When

Statistics:

30,000 arc flashes/year (NFPA)

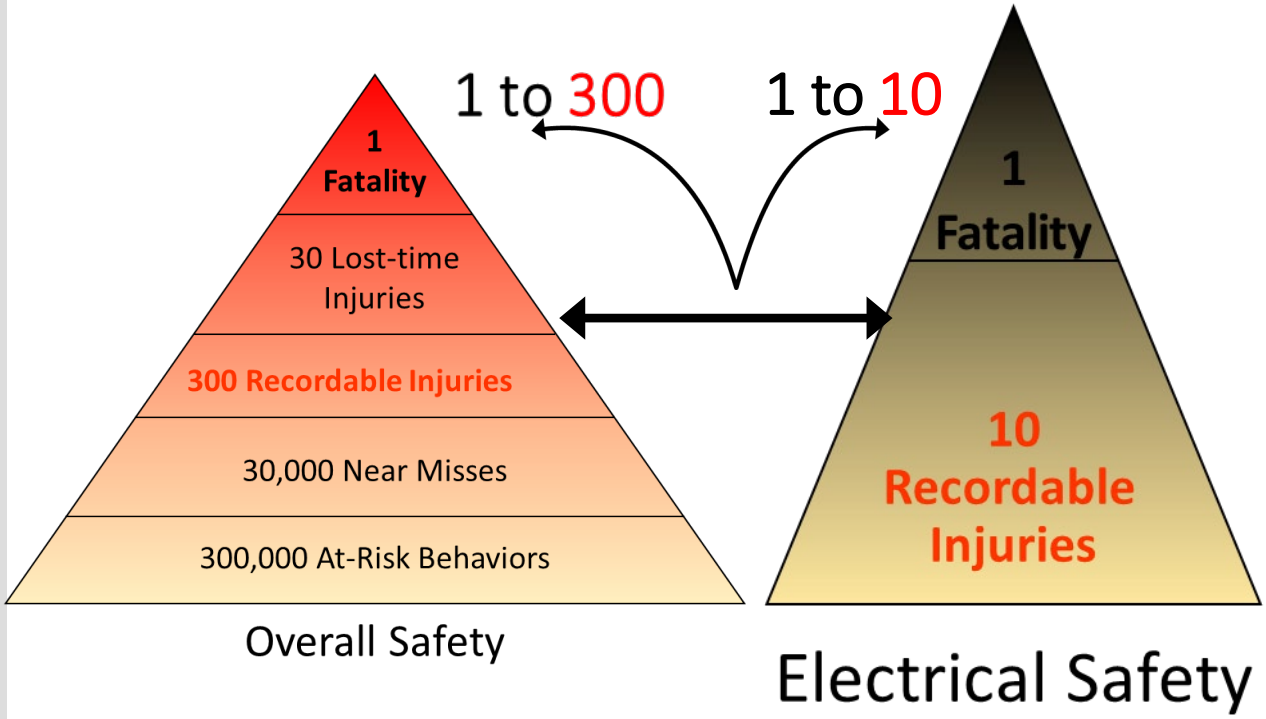
7,000 result in injury (OSHA)

2,000 admitted to burn center

300-400 fatalities annually

Importance of Electrical Safety

The Safety Pyramid!



Why an Arc Flash is Dangerous

You don't get just one…you get them ALL!

Heat

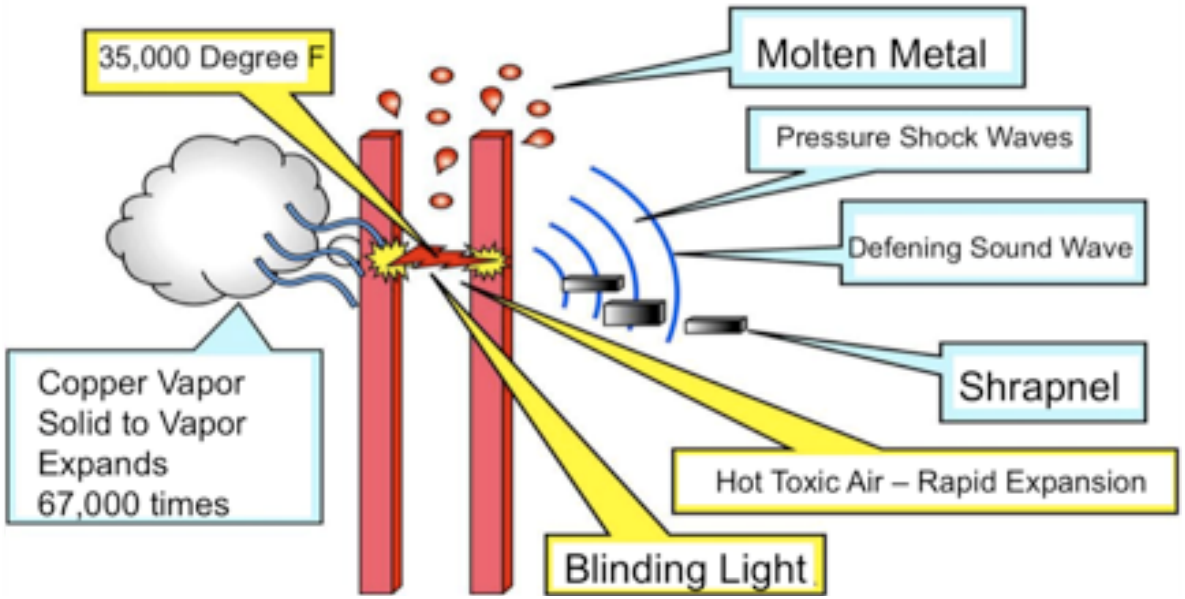
Molten Metal

Sound

Toxic Air

Pressure

Shrapnel



Understanding Body Burn

1st Degree
Red skin, no blister

2nd Degree
Blisters, Epidermis must regenerate

3rd Degree
Full thickness burn, skin cannot regenerate, & scar tissue forms

4th Degree
Damage to muscle & bone

Inhalation Injuries

Sources: Burn Survivor Resource Center: http://burnsurvivor.com/burn_types_first

The Cost of Body Burn

Direct Costs:

Medical

Wage Indemnity

Claims & Admin Fees

Additional Costs:

General Liability Costs & Litigation

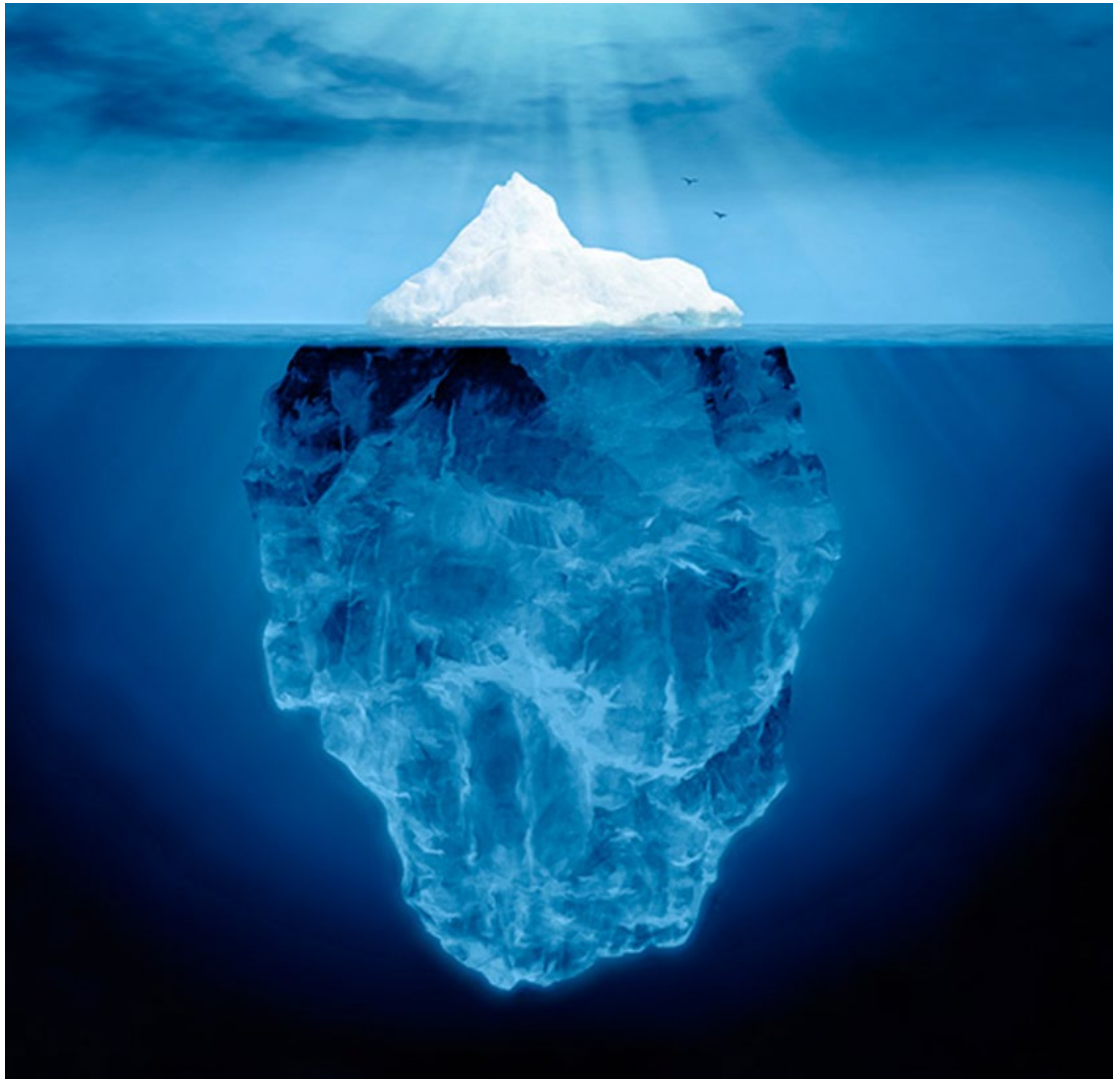
Lost Productivity & Quality

Insurance Premiums

Damage to Public Image

Potential OSHA Fines

Opportunity Costs

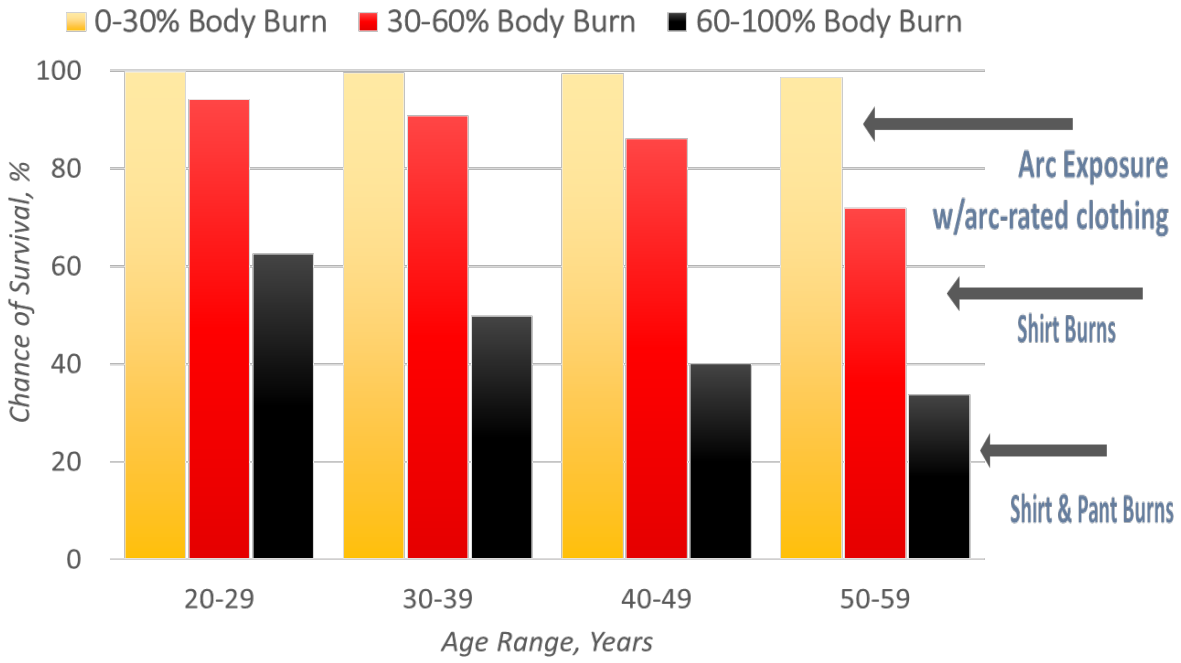


Sources: International Association of Oial & Gas Producers, Liberty Mutual Safety Index

Does PPE really work?

Key Factors to Survival

AGE and % of Body Burn



Source: ABA, National Burn Repository 2019 Update, Report Data 2009-2018, Table 9

NON-FR

CLOTHING ON MANIKIN

Pant = 100% Cotton

Shirt = 100% Cotton

EQUIPMENT

200 Amp Disconnect

TEST PARAMETERS

Voltage = 480

Amperage = 12.5 kA

Cycles = 10

Distance = 12"

"Arc in a Box"

CALCULATED ENERGY

Per IEEE 1584

8.4 cal/cm²

MAIN MENU

Top 10 Video Clips
No Manikin Clips
NON-FR Clips
INDURA® Ultra Soft® Clips

Return to Top 10 Index

Explosions created by 70E Solutions at KEMA Powertest

QUIT

INDURA Ultra Soft
Flame Resistant Fabrics

CLOTHING ON MANIKIN

Top 10 - Clip 5

Pant = INDURA® Ultra Soft® Style 451 9oz; After 100 Industrial Launderings
Shirt = INDURA® Ultra Soft® Style 301 7oz; After 100 Industrial Launderings

EQUIPMENT

100 Amp Disconnect

TEST PARAMETERS

Voltage = 480
Amperage = 11 kA
Cycles = 12
Distance = 12"
"Arc in a Box"

CALCULATED ENERGY

Per IEEE 1584

10.4 cal/cm²

MAIN MENU

Top 10 Video Clips
No Manikin Clips
NON-FR Clips
INDURA® Ultra Soft® Clips

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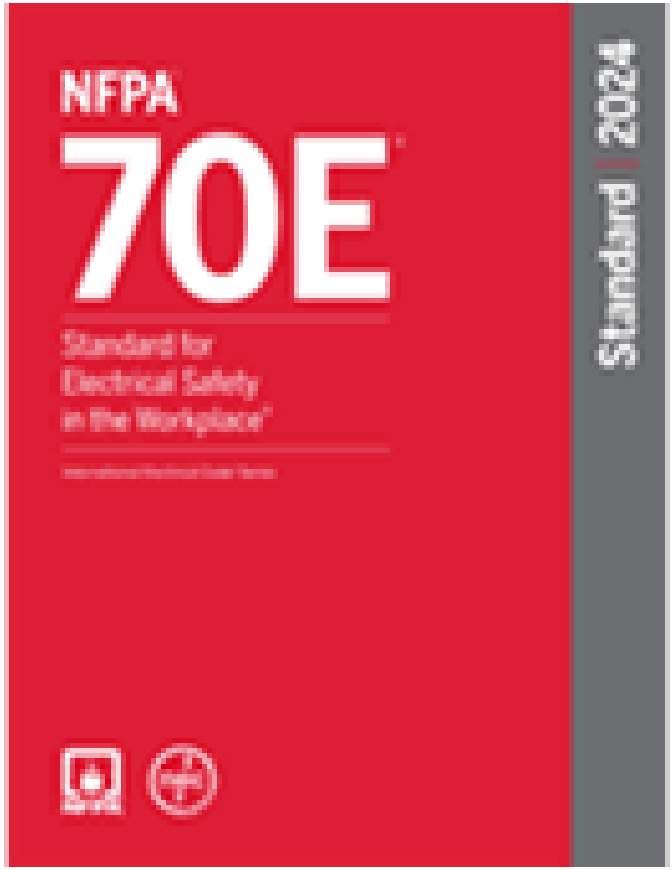
Explosions created by 70E Solutions at KEMA Powertest

QUIT

NFPA 70E
2024 Edition



- OSHA enforces NFPA 70E under 1910.132 and 1910.335.

Updates to NFPA 70E 2024 Edition

-Job Planning must include Emergency Response Plan

-New Annex (S) Assessing the Condition of Maintenance

-Moved ALL definitions to Article 100

- *Definitions specific to an Article will have article in parenthesis

-Verification of absence of voltage at EACH point of work.

-Shock approach boundaries coordinated better to OSHA

-Non-leather protectors with new standard ASTM F3258

-New Hazard thresholds for 2 Articles in Chapter 3

- *Art 320-Batteries and Battery Rooms
- *Art 340-Power Electronic Equipment

NFPA 70E Article 110.2 (Electrically Safe Work Condition)

Normal operation of electric equipment shall be permitted where a normal operating condition exists. A normal operating condition exists when all of the following conditions are satisfied:

(1) The Equipment is Properly Installed

(2) The Equipment is Properly Maintained

***NEW 2024* (3) The Equipment is Rated for the Available Fault Current**

(4) The Equipment is Utilized Properly

(5) The Equipment Doors are Closed and Secured

(6) All Equipment Covers are In Place and Secured

(7) There is No Evidence of Impending Failure

Arc Flash Risk Assessment

130.5 Page 26

A. General

1. To identify arc flash hazards

2. To estimate the likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health.

3. To determine if additional protective measures are required, including the use of PPE.

F. Arc Flash PPE

1. The incident energy analysis method

2. Arc flash PPE category method

Requirements Summary

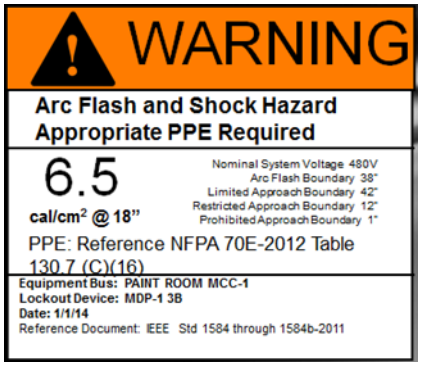
Site Risk Assessment	• Must be completed every 5 years or if equipment changes have been made
Training	• NFPA 70E Arc Flash Training for all employees who work with over 50v and is done every 3 years. First Aid, CPR and AED Training is also required every two years.
PPE / FRC	• Must provide correct PPE and FRC
Warning Labels	• Updated Labels must be on all equipment that poses an Arc flash risk (3 phase)
Electrical Safety Program (ESP)	• Needs to be reviewed and updated every 3 years

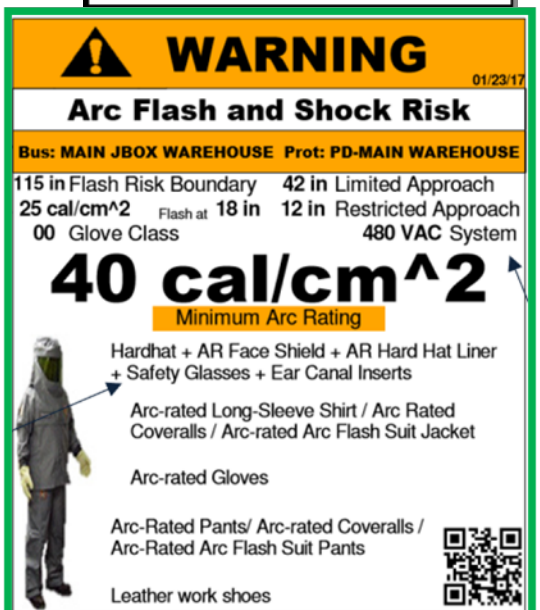
Labels- What needs them?

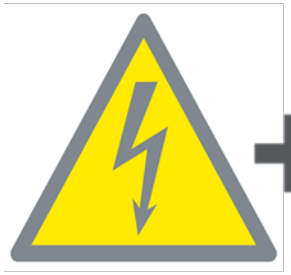
Look familiar?

Bad vs Good Labels

Any of these look familiar?







Arc Rated Clothing

+

Head Protection

+

Hand Protection

=

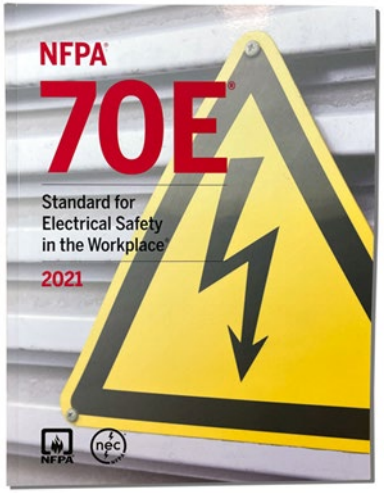
AED

+

CPR/AED Training

+

NFPA 70E Training



Comprehensive NFPA 70E Program

CATEGORY 2 REQUIRED PPE

Also fulfills NFPA 70E requirement of Category 1

CATEGORY 4 REQUIRED PPE

Also fulfills NFPA 70E requirement of Category 3

Category 2		Category 4
✓	Safety glasses or goggles	✓
✓	Hearing protection (inserts)	✓
✓	Insulated rubber gloves with leather protectors	✓
✓	EH heavy-duty leather footwear	✓
✓	Arc rated long sleeve shirt/coverall (8.0 ATPV or higher)	✓
✓	Arc rated long pants/coverall (8.0 ATPV or higher)	✓
✓	Hard hat with Arc rated face shield and balaclava	✓
	Arc rated coveralls	✓
	Arc rated (40 cal) Arc Flash suit jacket	✓
	Arc rated (40 cal) Arc Flash suit pants	✓
	Arc rated (40 cal) Arc Flash suit hood	✓

Daily wear
vs.
Task Wear

FRC Standards for Outerwear and Underneath

NFPA 70E 130.7 (c)(9)(b)- Outer Layers

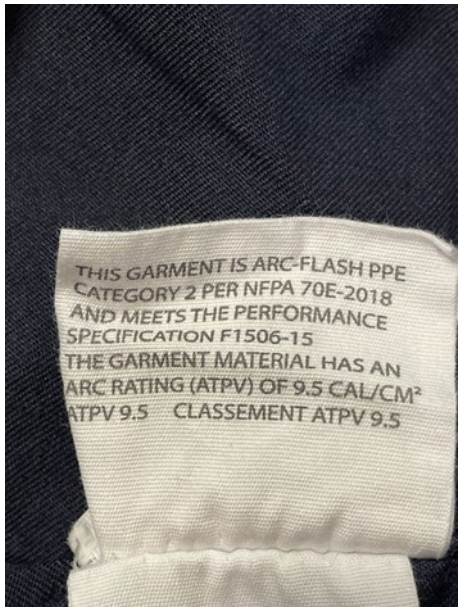
Garments worn as outer layers over arc-rated clothing, such as jackets high visibility apparel, or rainwear, shall also be made from arc-rated material.

NFPA 70E 130.7 (c)(9)(c)- Underlayers

Meltable fibers such as acetate, nylon, polyester, polypropylene, and spandex shall not be permitted in fabric underlayers (An incidental amount of elastic used on non-melting fabric underwear or socks shall be permitted.

Arc Rated Clothing Proper Labels

- Needs to show ATPV/EBT Rating
- Fabric Information
- ARC Cat and NFPA 2112 Label outside label
- UL Certification
- ASTM F1506 and ASTM F1595
- Many on Amazon don't have this and Amazon is not responsible



Retail Inspired Clothing is here!!!

No longer do you need to wear clothes that make you look like a rectangle! Seriously!!! Women you don't have to just wear men's cuts either!!!












Head and Hand Options

Arc Rated Clothing Layering Understand

- Must have it certified tested. Cannot just add the labels together.
- Many of the fabric manufactures have testing for their fabric only.
- Typically seen when needing over 12 cals and don't want arc suits

Report # K-418608-1401P16-R0	Test Report	
Samples Received: JAN 13, 2013 / Samples Tested: JAN 13, 2014	Kinectrics Inc., 800 Kipling Avenue, Unit 2 Toronto, Ontario, Canada Tel: 416-207-6000, www.kinectrics.com	KINECTRICS

Tested for

Hugh Hoagland
ArcWear.com
502-333-0510
arctesting@arcwear.com

Contact information for item tested:

Mount Vernon Mills, Inc.
91 Fourth St
Trion, GA 30753
706 734 4923

Test item description

Mount Vernon Mills, Inc.,
2 Layers,
Style Arapaho Twill, 7.0 oz/yd² 237 g/m² Twill, 88% Cotton 12% Nylon, Navy, AAD 8.4 oz/yd² 285 g/m²
over
Style Sauk Sateen, 6.5 oz/yd² 220 g/m² Sateen, 88% Cotton 12% Nylon, Gray, AAD 7.0 oz/yd² 237 g/m²,
ArcWear# 1401P16

Reference Standard

ASTM F1959/F1959M-12
Standard Test Method for Determining the Arc Rating of Materials for Clothing

Test Parameters: Test current: 8 kA; Arc Gap: 30 cm; Distance to Fabric: 30 cm; Number of samples analysed: 24; Incident Energy Range: 14 to 39 cal/cm²

Arc Rating, ATPV = 30 Cal/cm²
Heat Attenuation Factor, HAF = 90%

No variations to standard method noted.
Break-open Ebt not achieved or determined.
Samples tested as received, pre-test laundering as required by standard was arranged by client,

Care & Maintenance

Inspection

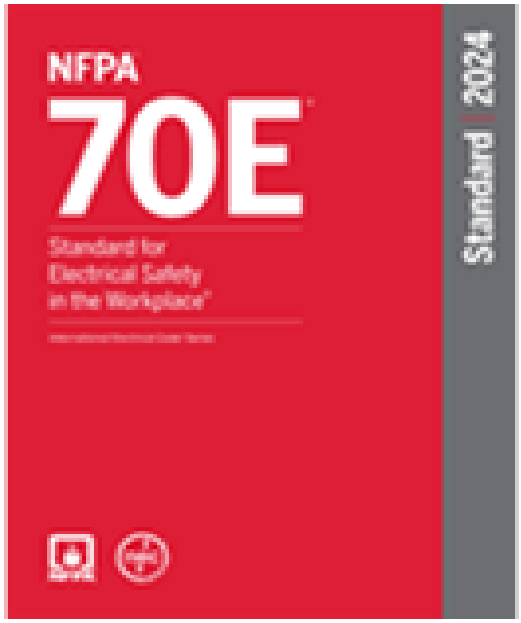
Manufacturers Instructions

Storage

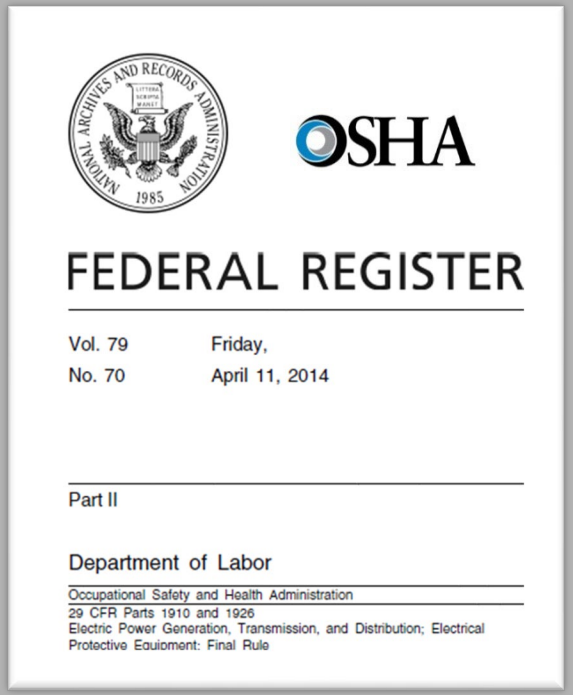
Cleaning, Repairing, and Affixing Items.

Key word is SHALL!

See details on Page 32



Important Considerations



FEDERAL REGISTER

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No. 70 April 11, 2014

Part II

Department of Labor

Occupational Safety and Health Administration
29 CFR Parts 1910 and 1926
Electric Power Generation, Transmission, and Distribution; Electrical Protective Equipment; Final Rule

"The OSH Act and the PPE standards at 1910.132 and 1926.96 make the **employer**, not the employee, responsible for the care and maintenance of PPE."

"If **employers** rely on home laundering of the clothing, they must train their employees in proper laundering procedures and techniques, and **employers** must inspect the clothing on a regular basis to ensure that it is not in need of repair or replacement."

"The Agency is not prohibiting home laundering of FR and arc-rated clothing. However, to comply with 1910.132 or 1926.95, **employers** cannot simply instruct employees to follow manufacturers' instructions."

FEDERAL REGISTER / VOL. 79, NO. 70 / FRIDAY, APRIL 11, 2014 / RULES AND REGULATIONS (PAGE 184 - 187)

Arc Rated Clothing Proper Use

- Always the outermost layer
- All natural, non-melting undergarments
- Clean, no flammable contaminants
- Repaired correctly and removed from service when needed

Before You Home Launder…

Do not use:

- chlorine bleach
- hydrogen peroxide
- starch
- fabric softeners
- pretreatment products

Use ***soft water***

Launder home and arc rated garments ***separately***.


www.Bandicam.com
The Hilgeman Group Accident Investigation
File #418

Conclusions & Next Steps

Set a meeting with leadership

Present/Discuss changes

Take action

Make improvements

Train & re-train

Revisit Electrical Safety with every NFPA 70E Revision

Thank You!

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