Reviewing How NFPA 70E (2024) Changes Impact Sustainable PPE Best Practices

Scott Francis, Technical Sales Manager | April 2024

Agenda

+ Arc Flash Basics
+ Review NFPA 70E Risk Assessment Procedure - Condition of Equipment!
+ Protection – Condition of FR/AR PPE Program?
+ Comfort – Innovative FR/AR Fabric Blends
+ Sustainability = Durability + Comfort
+ Trust - PPE Selection – Best Practices

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Arc Flash Basics

NFPA 70E PPE Cat 2 Arc Flash Scenario

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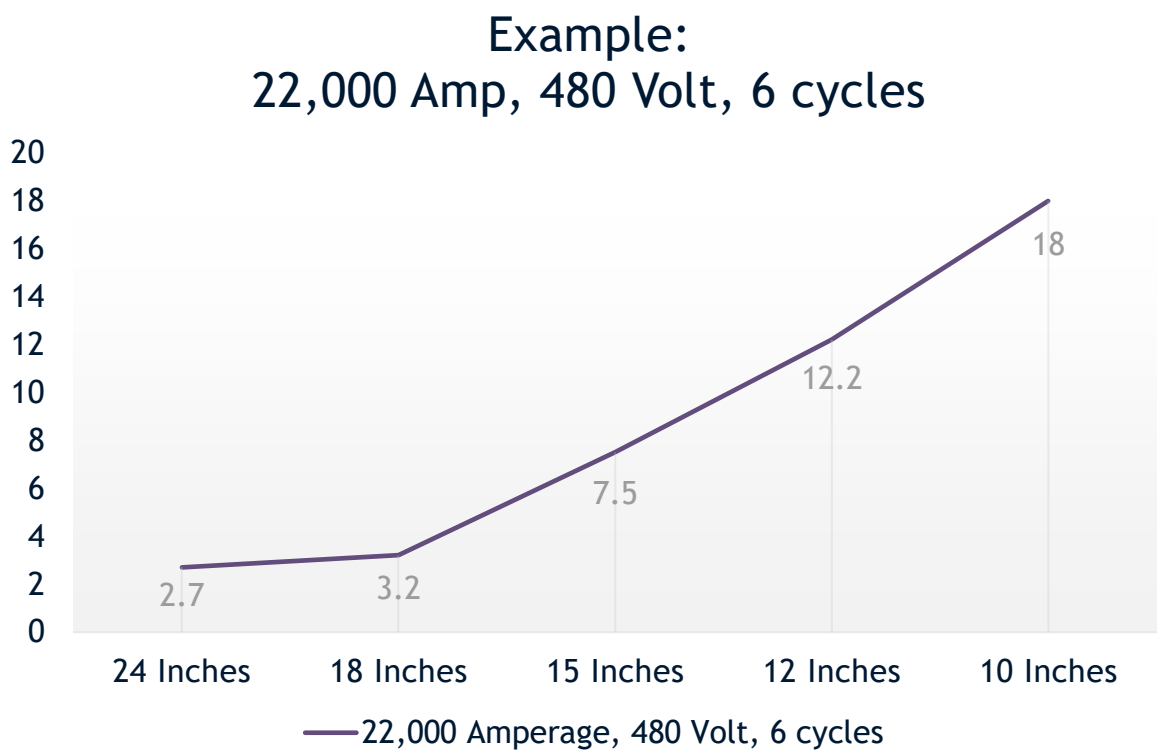
Arc Flash Hazard

+ A dangerous release of energy created by an electrical fault
+ Release will contain:
  - Thermal energy
  - Acoustical energy
  - Pressure wave
  - Debris

Intensity of an Arc Flash

Variables that effect the incident energy of an electrical arc flash:

+ Amperage
+ Voltage
+ Arc gap
+ Cycle time
+ Distance away from arc
+ 3 phase vs. single phase
+ Confined space



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Arc Energy Basics

+ Incident energy expressed in cal/cm^2
+ Arc rating of clothing/PPE expressed in cal/cm^2
+ Approx. 1 cal/cm^2 = hottest part of lighter in 1 sec
+ An exposure of only 1.2 calories/cm2 will cause second-degree burn on human skin
+ Typical non-FR workwear can ignite @ 4-5 cals

Dangers of Non-FR Clothing

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Review NFPA 70E Risk Assessment Procedure

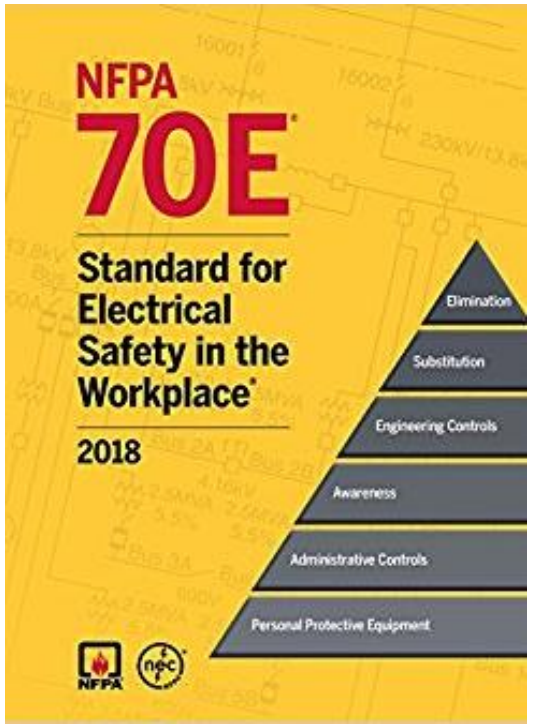
Risk Assessment Review

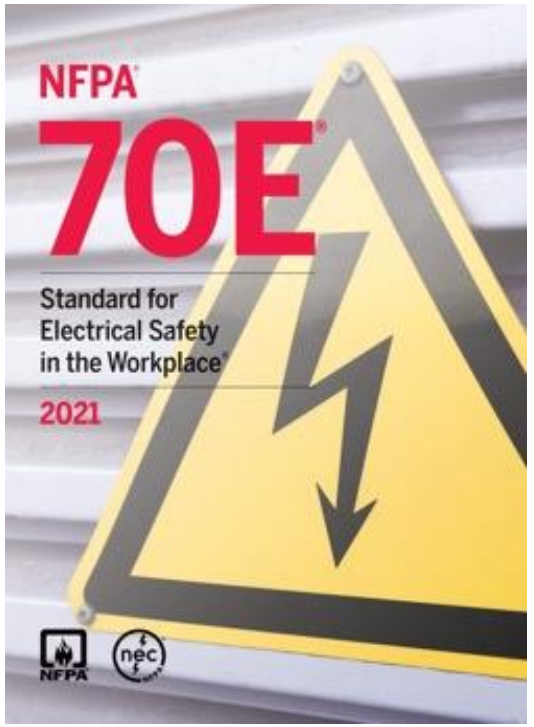
When?

+ Data reviewed every 5 years or when changes occur to the system. Equipment label updated, if needed.

Impacts

1. Incident energy or PPE category
2. Arc flash boundary
3. PPE selection
4. OSHA compliance – CFR 1910.132
5. Electrical safety program





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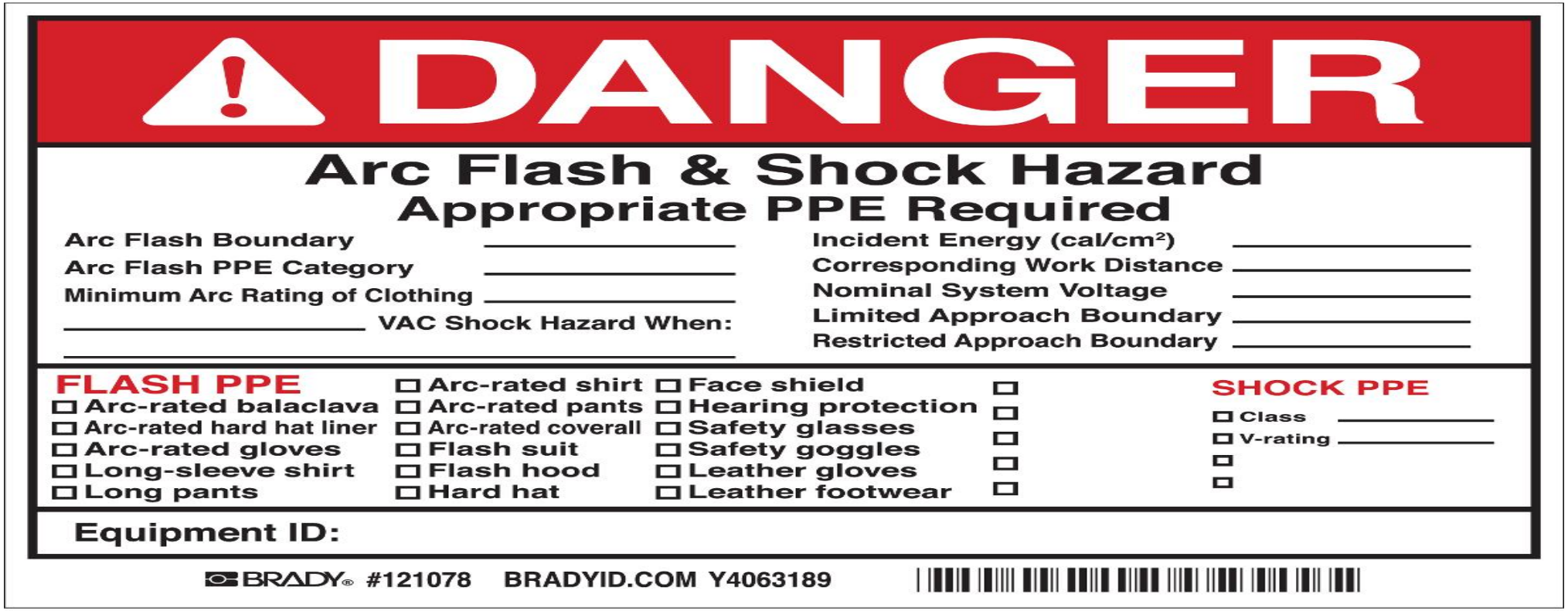
Equipment Labels – PPE Category or Incident Energy



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Article 130.5 Arc Flash Risk Assessment - Review

New 130.5 (A) General

01

Identify arc flash hazards

02

Estimate the likelihood of occurrence and potential severity of injury

03

Determine if additional protective measures are required, including the use of PPE

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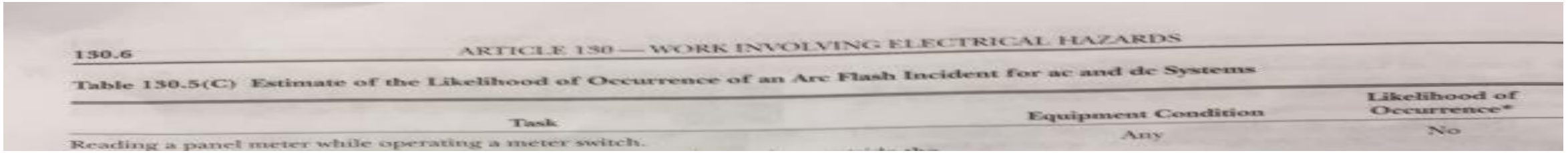
Estimate of Likelihood and Severity

+ Consider design of electrical equipment – overcurrent protective device and operating time

+ Consider electrical equipment operating condition and maintenance condition, assess the preventative maintenance program (Informative Annex S)

+ Use of Table 130.5 (C) can be used to estimate likelihood of arc flash occurrence

Likelihood of Occurrence of an Arc Flash – Task, Condition

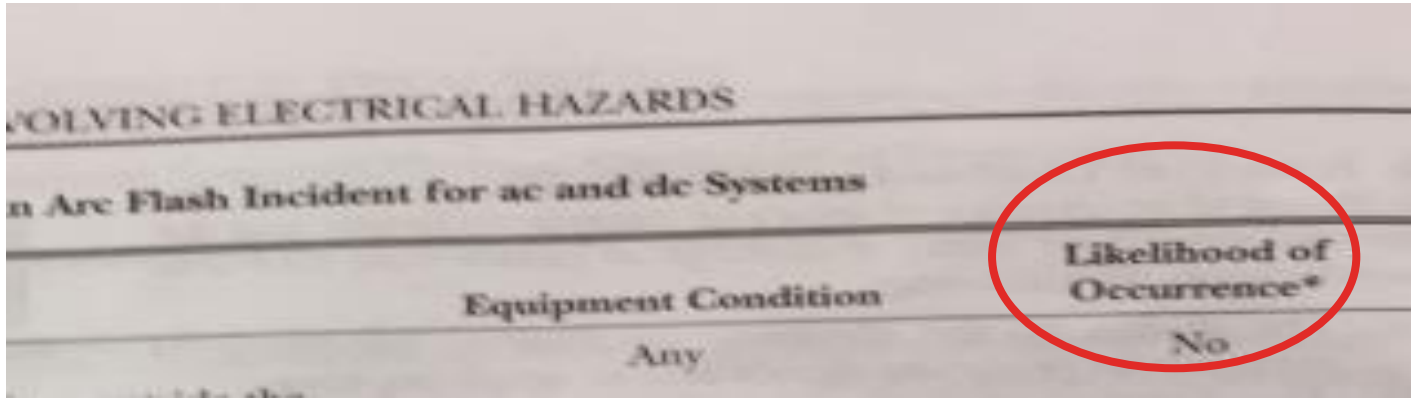


130.6 ARTICLE 130 — WORK INVOLVING ELECTRICAL HAZARDS

Table 130.5(C) Estimate of the Likelihood of Occurrence of an Arc Flash Incident for ac and dc Systems

Task	Equipment Condition	Likelihood of Occurrence*
Reading a panel meter while operating a meter switch.	Any	No

[b]As defined in this standard, the two components of risk are the likelihood of occurrence of injury or damage to health and the severity of injury or damage to health that results from a hazard. Risk assessment is an overall process that involves estimating both the likelihood of occurrence and severity to determine if additional protective measures are required. The estimate of the likelihood of occurrence contained in this table does not cover every possible condition or situation, nor does it address severity of injury or damage to health. Where this table identifies "No" as an estimate of likelihood of occurrence, it means that an arc flash incident is not likely to occur. Where this table identifies "Yes" as an estimate of likelihood of occurrence, it means an arc flash incident should be considered likely to occur. The likelihood of occurrence must be combined with the potential severity of the arcing incident to determine if additional protective measures are required to be selected and implemented according to the hierarchy of risk control identified in 110.5(H)(3).



OLVING ELECTRICAL HAZARDS

n Arc Flash Incident for ac and dc Systems

Equipment Condition	Likelihood of Occurrence*
Any	No

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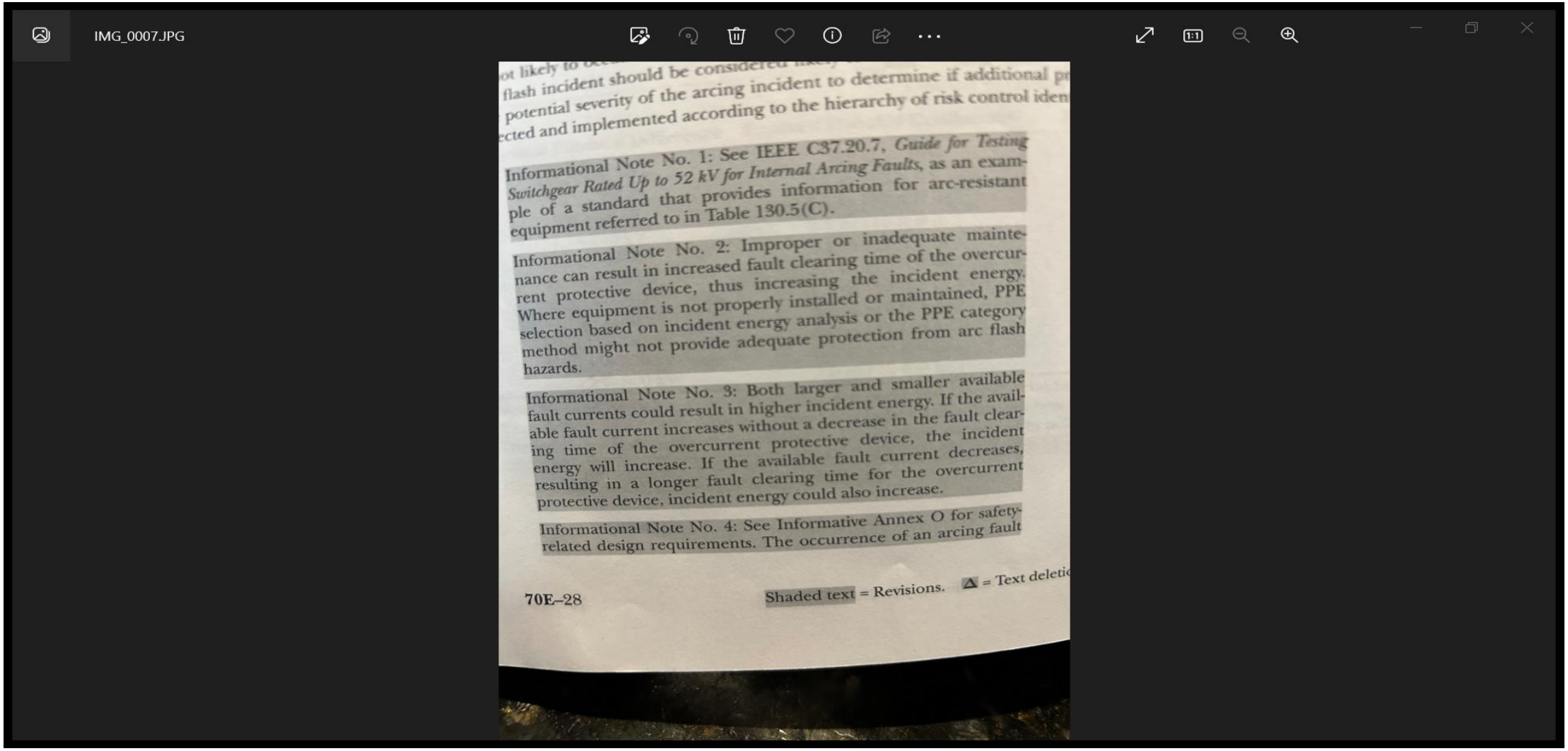
70E Notes Table 130.5 (C) – Assessing Maintenance



flash incident should be considered
potential severity of the arcing incident to determine if additional pr
ected and implemented according to the hierarchy of risk control iden

Informational Note No. 1: See IEEE C37.20.7, *Guide for Testing Switchgear Rated Up to 52 kV for Internal Arcing Faults*, as an example of a standard that provides information for arc-resistant equipment referred to in Table 130.5(C).

Informational Note No. 2: Improper or inadequate maintenance can result in increased fault clearing time of the overcurrent protective device, thus increasing the incident energy. Where equipment is not properly installed or maintained, PPE selection based on incident energy analysis or the PPE category method might not provide adequate protection from arc flash hazards.

Informational Note No. 3: Both larger and smaller available fault currents could result in higher incident energy. If the available fault current increases without a decrease in the fault clearing time of the overcurrent protective device, the incident energy will increase. If the available fault current decreases, resulting in a longer fault clearing time for the overcurrent protective device, incident energy could also increase.

Informational Note No. 4: See Informative Annex O for safety-related design requirements. The occurrence of an arcing fault

70E–28

Shaded text = Revisions. Δ = Text deleti

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Table 130.5 (C) Likelihood of Occurrence of an Arc Flash

+ Yes/No answer for likelihood of occurrence

  - Yes means arc flash is likely to occur, so additional protective measures like PPE are required

+ Use arc flash PPE category and PPE tables
  - Tables 130.7 (C) (15) a, b, and c, if using PPE category method
  - OR use incident energy analysis method

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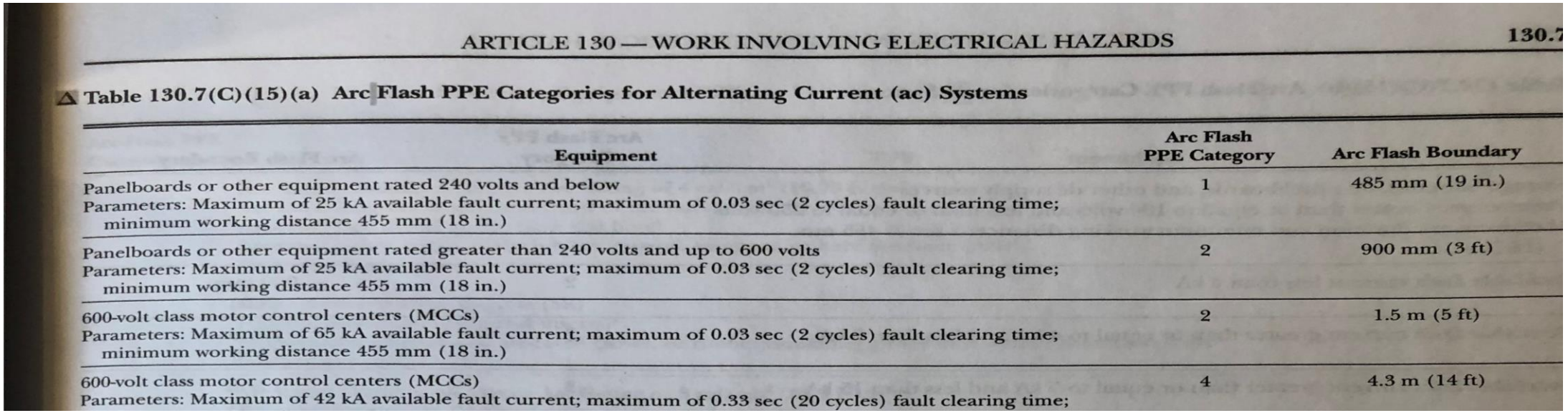
Arc Flash PPE Category Method/NFPA 70E Tables Method

+ Changes: Do the electrical changes/additions impact the equipment parameters such as available fault current and clearing time? Do the changes still meet the parameter criteria listed for that equipment type in the PPE category table? If parameter criteria are not met, use the incident energy analysis method.



ARTICLE 130 — WORK INVOLVING ELECTRICAL HAZARDS 130.7

Δ Table 130.7(C)(15)(a) Arc Flash PPE Categories for Alternating Current (ac) Systems

Equipment	Arc Flash PPE Category	Arc Flash Boundary
Panelboards or other equipment rated 240 volts and below Parameters: Maximum of 25 kA available fault current; maximum of 0.03 sec (2 cycles) fault clearing time; minimum working distance 455 mm (18 in.)	1	485 mm (19 in.)
Panelboards or other equipment rated greater than 240 volts and up to 600 volts Parameters: Maximum of 25 kA available fault current; maximum of 0.03 sec (2 cycles) fault clearing time; minimum working distance 455 mm (18 in.)	2	900 mm (3 ft)
600-volt class motor control centers (MCCs) Parameters: Maximum of 65 kA available fault current; maximum of 0.03 sec (2 cycles) fault clearing time; minimum working distance 455 mm (18 in.)	2	1.5 m (5 ft)
600-volt class motor control centers (MCCs) Parameters: Maximum of 42 kA available fault current; maximum of 0.33 sec (20 cycles) fault clearing time;	4	4.3 m (14 ft)

+ Every 5 years: The data supporting the information on the electrical equipment label (regardless of method) must be reviewed for accuracy at intervals not exceeding 5 years

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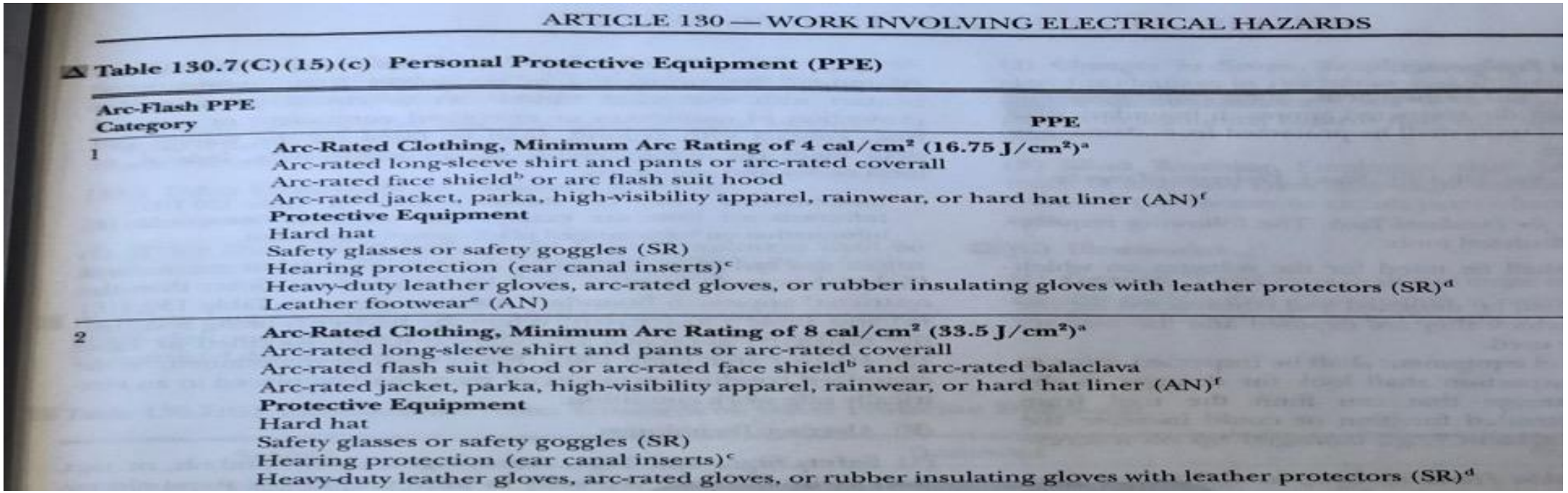
PPE Selection via 2 Methods

+ OR via incident energy analysis method – simply select arc-rated clothing with an arc rating equal to or greater than the estimated incident energy determined by methods in Annex D



ARTICLE 130 — WORK INVOLVING ELECTRICAL HAZARDS

Table 130.7(C)(15)(c) Personal Protective Equipment (PPE)

Arc-Flash PPE Category	PPE
1	**Arc-Rated Clothing, Minimum Arc Rating of 4 cal/cm² (16.75 J/cm²)[a]** Arc-rated long-sleeve shirt and pants or arc-rated coverall Arc-rated face shield[b] or arc flash suit hood Arc-rated jacket, parka, high-visibility apparel, rainwear, or hard hat liner (AN)[f] **Protective Equipment** Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts)[c] Heavy-duty leather gloves, arc-rated gloves, or rubber insulating gloves with leather protectors (SR)[d] Leather footwear[e] (AN)
2	**Arc-Rated Clothing, Minimum Arc Rating of 8 cal/cm² (33.5 J/cm²)[a]** Arc-rated long-sleeve shirt and pants or arc-rated coverall Arc-rated flash suit hood or arc-rated face shield[b] and arc-rated balaclava Arc-rated jacket, parka, high-visibility apparel, rainwear, or hard hat liner (AN)[f] **Protective Equipment** Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts)[c] Heavy-duty leather gloves, arc-rated gloves, or rubber insulating gloves with leather protectors (SR)[d]

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Protection – Condition of FR/AR Program?

Additional Protective Measures

Hierarchy of Risk Control Methods

The risk assessment procedure shall require that preventative and protective risk control methods be implemented in accordance with the following hierarchy:

1. Elimination
2. Substitution
3. Engineering controls
4. Awareness
5. Administrative controls
6. PPE

PPE usually seen as a protective measure, preventative measure?

Human Error

- “The risk assessment procedure shall address the potential for human error and its negative consequences on people, processes, the work environment, and equipment.”

- “Informational Note: the potential for human error varies with factors such as tasks and the work environment. See information Annex Q.”

- Hierarchy of Risk Controls: No risk control infallible. All of the controls are subject to errors in human performance!

PPE Culture: Top Reasons Employees Fail to Wear PPE

+ Forgetfulness: “I just forgot”
+ Misunderstanding: “I didn’t know”
+ Fearlessness, Overconfidence, Complacency: ”I won’t get in an accident,” “I’ve gone my entire career without an accident,” “That only happens to other people”
+ Time Constraints: “I didn’t have the time” or “It takes too much time”
+ Discomfort: “It doesn’t fit right” or “It’s not comfortable”

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Condition of AR/FR Clothing-PPE Program?

TASK-BASED

+ Proper FR/AR clothing is put on to perform a specific task.

DAILY WEAR

+ Proper AR/FR clothing is worn at all times during work hours.

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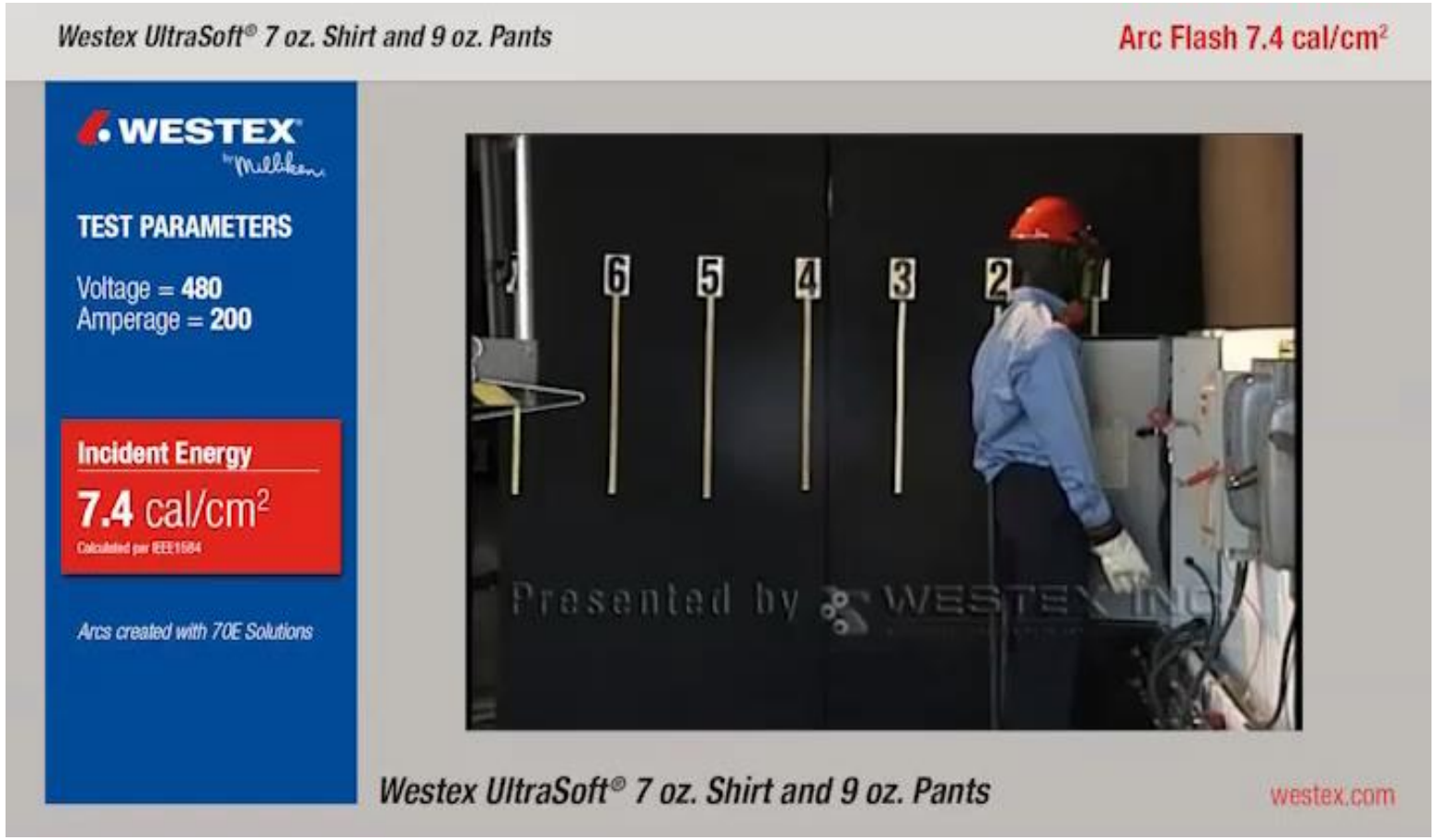
FR/AR Clothing: Self Extinguish Westex® UltraSoft®



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Two Key FR/AR PPE Roles

Self Extinguish

+ FR Mechanisms – No Fuel, Free Radical Scavengers

Insulate

+ Arc Flash – Arc Rating

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FR/AR Clothing

20 cal/cm^2

8 cal/cm^2

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Layered Arc Ratings (ATPV)

+ UltraSoft 8.7 cal/cm^2 over 8.7 cal/cm^2 = 26.8 cal/cm^2

+ UltraSoft 8.7 cal/cm^2 over 8.9 cal/cm^2 knit = 29 cal/cm^2

+ DH Air 9.1 cal/cm^2 over 6 cal/cm^2 base layer = 18 cal/cm^2

+ UltraSoft 8.7 cal/cm^2 over 8.2 cal/cm^2 iQ knit = 27 cal/cm^2

+ Layered arc ratings are usually more than additive, need to be determined experimentally

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Garment Labels

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Garment Labels

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Molten Metal/ Welding Sparks

FR fabrics used: FR Cotton rich fabrics for iron containing metals, (Indura and Ultra Soft)
For white metals like Aluminum: Vinex or Oasis

Molten Metal and Welding Applications – EN ISO 11611

Property – fabric	Test method	Requirement	Evaluation fabrics MPG S000106981/ ...6987 MPG S000108991/ ...8997
Limited flame spread Face ignition	ISO 15025 method A	- no further flaming to top or sides - no flaming or melting debris - no hole formation - afterglow time ≤ 2 s - afterflame time ≤ 2 s	**A1** met met met met met
Limited flame spread Edge ignition	ISO 15025 method B	- no further flaming to top or sides - no flaming or melting debris - afterglow time ≤ 2 s - afterflame time ≤ 2 s	**A2** met met met met
Small hot metal drops	ISO 9150	Class 1 ≥ 15 droplets Class 2 ≥ 25 droplets	**Class 1** met
Radiant heat	ISO 6942	Class 1 $RHTI_{24}$ ≥ 7s Class 2 $RHTI_{24}$ ≥ 16s	**Class 1** met
Vertical Resistance	EN 1149-2	> 10^5 Ω	met
EN 1149-5: Electrostatic dissipative behaviour	EN 1149-3, method 2	Half decay time < 4s or Shielding factor > 0,2	met
Dimensional change after 5 washing cycles	EN 25077	≤ ± 3 %	met
EN 61482-2: Limited flame spread	ISO 15025 method A	no further flaming to top or sides no flaming debris no afterglowing no hole formation afterflame time ≤ 2 s	met met met met met
Heat resistance / shrinkage	ISO 17493 (180 ± 5) °C	Shrinkage ≤ 5% no ignition no melting	met met met
Vertical Resistance	IEC 61340-2-3 Clause 8.2.3	> 10^5 Ω	met
Tear strength	ISO 13937-2	150 to 220 g/m² ≥ 10 N > 220 g/m² ≥ 15 N	- met
Tensile strength	ISO 13934-1	150 to 220 g/m² ≥ 250 N > 220 g/m² ≥ 400 N	- met
Dimensional change after 5 washing cycles	ISO 5077	≤ ± 3 %	met

Molten Metal and Welding Applications – EN ISO 11612

3.3 Test methods/ -fundamentals/ Requirements/ Evaluation:

Testing and evaluation are based on the instructions in Regulation (EU) 2016/425 in connection with the documents EN ISO 11612:2015, EN ISO 11611:2015, EN ISO 20471:2013+A1:2016, EN 13034+A1:2009 in connection with EN 14325:2004, EN 1149-5:2018 in connection with EN 1149-3:2004, EN 61482-2:2020 in connection with EN 61482-1-2:2014.

Property - fabric	**Test method**	**Requirement**	**Evaluation** fabrics MPG S000106981/ ...6987 MPG S000108991/ ...8997
EN ISO 11612: Heat resistance / shrinkage	ISO 17493 (180 ± 5) °C	Shrinkage ≤ 5% no ignition no melting	met met met
Limited flame spread face ignition	ISO 15025 method A	- no further flaming to top or sides - no flaming or melting debris - no hole formation - afterglow time ≤ 2 s - afterflame time ≤ 2 s	**Code A1** met met met met met met
Limited flame spread edge ignition	ISO 15025 method B	- no further flaming to top or sides - no flaming or melting debris - afterglow time ≤ 2 s - afterflame time ≤ 2 s	**Code A2** met met met met met
Dimensional change after 5 washing cycles	ISO 5077	≤ ± 3 %	met
Tensile strength	ISO 13934-1	≥ 300 N	met
Tear strength	ISO 13937-2	≥ 10 N	met
Convective heat Heat transfer index HTI_{24}	ISO 9151	B1 4 to < 10 s B2 10 to < 12 s B3 ≥ 20 s	**Code B1** met
Radiant heat Heat transfer index $RHTI_{24}$	ISO 6942	C1 7 to < 20 s C2 20 to < 50 s C3 50 to < 95 s C4 ≥ 95 s	**Code C1** met
Molten iron splash index after 5 washing cycles	ISO 9185	E1 60 to < 120 g E2 120 to < 200 g E3 ≥ 200 g	**Code E1** met
Contact heat Threshold time	ISO 12127	F1 5 to < 10 s F2 10 to < 15 s F3 ≥ 15 s	**Code F1** met
EN ISO 11611: Tensile strength	ISO 13934-1	≥ 400 N	met
Tear strength	ISO 13937-2	Class 1 ≥ 15 N Class 2 ≥ 20 N	**Class 2** met
Dimensional change after 5 washing cycles	ISO 5077	≤ ± 3 %	met

Comfort – Innovative FR/AR Fabrics

PPE Culture: Top Reasons Employees Fail to Wear PPE

+ Forgetfulness: “I just forgot”
+ Misunderstanding: “I didn’t know”
+ Fearlessness, Overconfidence, Complacency: ”I won’t get in an accident,” “I’ve gone my entire career without an accident,” “That only happens to other people”
+ Time Constraints: “I didn’t have the time” or “It takes too much time”
+ Discomfort: “It doesn’t fit right” or “It’s not comfortable”

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Comfort

3 Key Factors That Influence Comfort

1) Thermal Comfort & Moisture Management
   - *Ability to transport heat and moisture away from the body*
2) Tactile (Hand) Properties
   - *Perception of fabric touch and feel*
3) Garment Fit / Design
   - *Closeness, tightness, and compression of garment*

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Comfort Basics: **4 primary ways our bodies release and regulate heat**

Radiation (Dry Heat Transfer)

Heat and energy from a warmer body “radiates” into a cooler atmosphere

Convection (Dry Heat Transfer)

Lose heat through the movement of air around our body

Conduction (Dry Heat Transfer)

Heat flows from your body through direct contact with a cooler object

Evaporation (Wet Heat transfer or Evaporative Heat transfer)

As the amount of heat being removed from the body decreases, sweat is created.

As the sweat evaporates into the atmosphere, heat is removed and the body cools

Comfort - **The Difference In The Cooling Mechanisms**

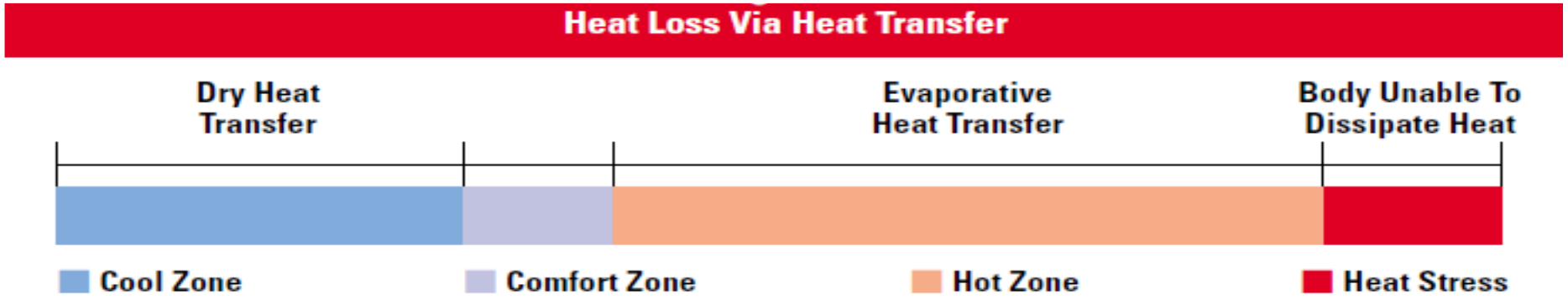
Heat stress occurs when the body can no longer cool itself

+ ***Dry Heat Transfer – Cooler Environments***

In cooler environments heat loss through radiation, convection, and conduction are more prominent

+ ***Wet Heat Transfer – Hot Environments***

In hot environments when the temperature is greater than that of your body (~ 90 to 95˚ F), the primary method of cooling is wet heat transfer or evaporation



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Heat Stress

No single layer, breathable woven/knit fabric (FR or not) causes heat illness.

Examples of heat illness causes:

+ Poor hydration
+ Lack of rest breaks
+ Lack of shade
+ Poor health

Comfort - Wet / Evaporative Heat Transfer - Cooling In Hot Climates

Managing sweat / moisture is a critical part of thermal comfort

FR clothing's role in moisture management

+ Moisture travels in both vapor and liquid forms away from the body
+ Moisture vapor can pass between fibers and through openings in the fabric
+ Liquid / sweat is transmitted from the skin to the fiber's surface before evaporating into the air
+ Poor moisture management can make a garment feel clammy, clingy, sticky, and heavy

Comfort: Fibers Role in Moisture Management

Fibers with high moisture absorbency – hydrophilic

+ Increased ability to absorb moisture and sweat
+ Saturated fibers swell, decreasing the fabrics ability to breath
+ Can take longer to dry and can feel wet and heavy
+ Cellulosic (i.e. Lyocell) / “natural” fibers (i.e. cotton, wool, silk)

Fibers with lower moisture absorbency - hydrophobic

+ Absorbs less moisture than hydrophilic fibers
+ Dries faster due to lower moisture content
+ Synthetic fibers (i.e. polyester, modacrylic, aramid – Nomex®)

+ ***Innovative fabric blends now can have both fiber types***
+ Engineered fabric blends, like *Westex® DH Air™* incorporate both fiber types to optimize moisture management

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Comfort – Tactile (Hand) Properties

Fabric Hand – The Touch and Feel Fabric hand is the feeling of the garment on your skin.

+ Senses perception when touching and feeling a fabric.

+ Common approach - rub fabric between fingers.

+ Large differences are often noticeable and at times visible, but individual preference can vary.

+ Fabric hand is arguably the most subjective and along with thermal comfort and garment fit contribute toward overall rating of garment comfort.

Why FR/AR Blends? Comfort = Protection

The market was asking for solutions in protective apparel that addressed the following criteria:

Comfort	Excellent breathability for comfort in hot environments, moisture management and soft feel
Protection	Cat 2 arc protection, NFPA 2112 certified with low body burn % and minimal thermal shrinkage
Value	Provides lifelong protection, cost effectiveness and shrinkage control
Appearance	Wash and wear ability, improved appearance after laundering with stylish look
Confidence	Lifelong protection

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Comfort – Innovative FR/AR Fabrics

The latest FR/AR fabrics are blends and are deemed more comfortable.

Why? Lighter weight, air permeability and moisture management.

Fabric brands:

+ Westex® DH and DH Air™
+ Knit FR fabrics
+ Glenguard
+ Tencate Tecasafe One
+ Arvind – Carhartt FR Force

Westex® DH Air

Westex® DH Air™ is comprised of a patent-pending fiber blend of 47% TENCEL™ Lyocell, 38% Modacrylic and 15% Aramid.

47% TENCEL™ Lyocell

+ Cellulosic fiber – provides comfort and performance similar to cotton, but stronger
+ Fabric performance – moisture wicking and breathable fiber, wide range of dyeing options, comfortable

38% Modacrylic

+ FR protection – provides protection to the fabric structure
+ Fabric performance – abrasion resistance, ability to dye into solid colors

15% Aramid

+ FR protection – provides thermal stability, improved arc flash
+ Fabric performance– enhances fabric strength and durability

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FR/AR Fabric Blend Competitive Landscape

Product	Published Weight (oz/yd^2)	Composition	FR Durability	ATPV / NFPA 70E Category	NFPA 2112
Westex® DH Air™	5.5	47% TENCEL™ Lyocell 38% Modacrylic 15% Aramid	Inherently FR	9.1 cal/cm^2 Category 2	Yes
Arvind/Carhartt FR Force	4.7	50% Lenzing FR 38% Aramid 10% Polyamide 2% Antistat	Inherently FR	8.6 cal/cm^2 Category 2	Yes
Tecasafe One	5.5	51% Lyocell 39% Modacrylic 10% Aramid	Inherently FR	8.2 cal/cm^2 Category 2	Yes
Glenguard	5.5	74% Kermel 20% Modacrylic 5% Twaron 1% Antistat	Inherently FR	9.5 cal/cm^2 Category 2	Yes

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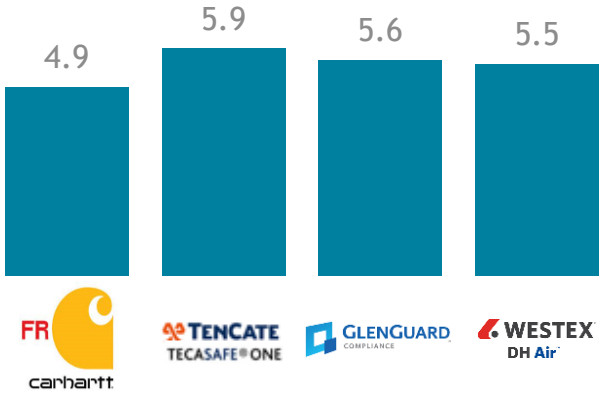
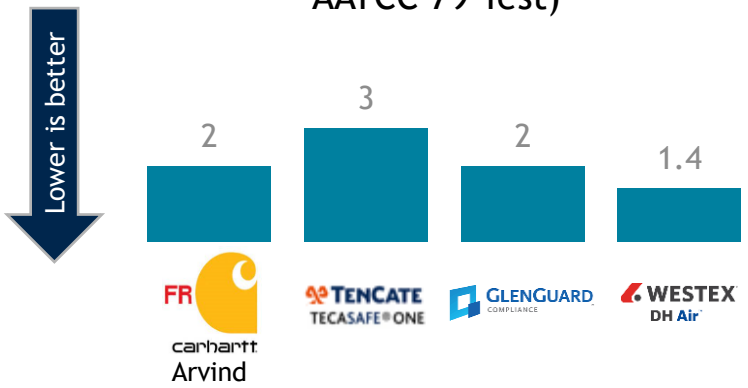
Blended Fabrics Attributes - Comfort

Fabric Weight (oz/yd^2)

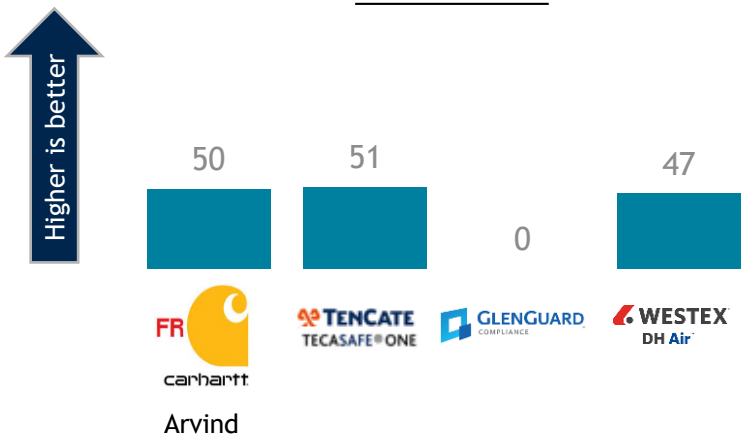


Low fabric weight is not the only indication for comfort.

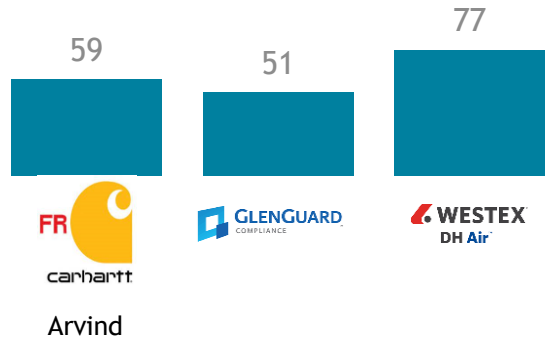
Water Drop
AATCC 79 Test)



Cellulosic %



Air Permeability
ASTM D737)



Note: Water drop testing is performed as received.

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Comfort is Inherently Subjective

+ Not linked to weight across fiber types
+ Not linked to weight within type until >30% delta
+ Wear tests are the best way to judge
+ Wear tests will help develop consensus on FR/AR clothing options
+ Employee engagement opportunity

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Sustainability

Sustainability Key Questions

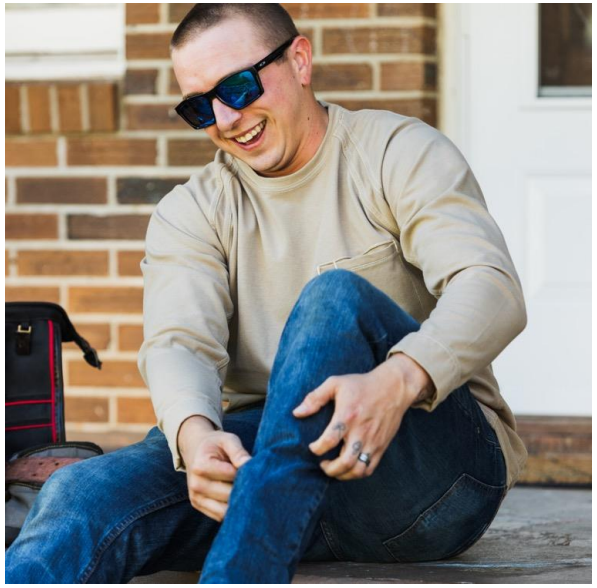
1. Material selection: Durable? Comfortable? Fibers utilized are sustainable from renewable or recycled sources?

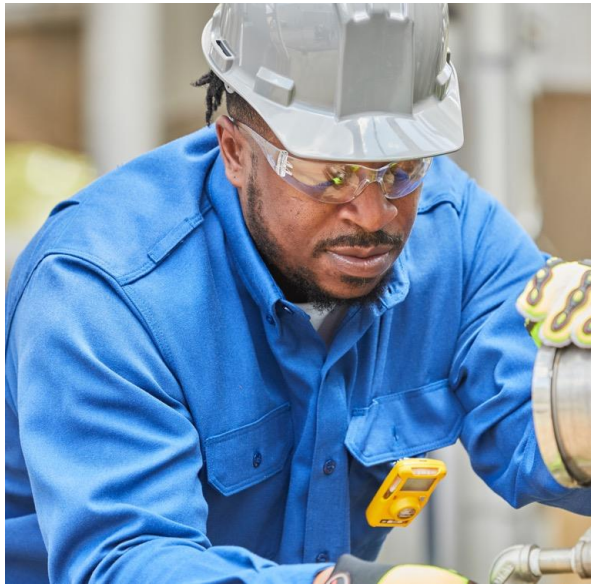
2. Manufacturing processes: GHG emission reductions? (net zero?)

3. Fabric finishes and certifications? PFAS?

Textile Durability

+ By using materials that are designed to last longer, companies can reduce the need for disposable FR/AR clothing and lower the amount of waste that is sent to landfills.





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A MILLIKEN BRAND

REPREVE® Fibers

Transforming plastic bottles into certifiable, traceable high-performance yarn.

+ Recycled bottles and post-industrial waste collected worldwide
+ Waste material is chopped, ground, washed and turned into flake to remove contaminants
+ Waste flake is melted and reformulated into high-quality resin
+ Resin is melted into liquid polymer and extruded to form fiber, which is spun and air-jet textured into yarn found in our Westex® Indigo® style 329 denim




WESTEX A MILLIKEN BRAND

Why do we use TENCEL™ Lyocell

- Sustainable product – wood
  - This is a sustainable raw material – the raw material pulp is derived from the renewable resource, wood.
  - TENCEL standard fibers are certified with the EU Ecolabel, a verified third-party label of environmental excellence that is awarded to products and services meeting high environmental standards throughout their life-cycle.

EU Ecolabel
www.ecolabel.eu

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The Path to Net-Zero

Does your manufacturing partner have plans to achieve net-zero targets approved by SBTi; they align to meet the goals of the Paris Climate Agreement and Sustainable Development Goals.

According to a recent report from the International Panel on Climate Change, it is still possible to limit global temperature rise 1.5°C, which climate scientists believe is the necessary threshold for human health and wellbeing.

SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

Manufacturing Processes

Milliken's Approved SBTi Net-Zero GHG Targets to meet 1.5 C.

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Lowering GHG Emissions Through Cogeneration

Magnolia Finishing Plant now creates energy using steam to run its operation.

+ Reduces greenhouse gas (GHG) emissions
+ Eliminates coal as the primary steam fuel source

1000

tons of coal diverted from disposal after useful life

20%

increase in energy efficiency

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Manufacturing Processes

NEAR-TERM TARGETS (2030)

Milliken & Company commits to reduce absolute scope 1 and scope 2 GHG emissions 50.4% by 2030 from a 2018 base year.

Milliken & Company also commits to reduce absolute scope 3 GHG emissions 30% by 2030 from a 2018 base year.

LONG-TERM TARGETS (2050)

Milliken & Company commits to reduce absolute scope 1, scope 2 and scope 3 GHG emissions 90% by 2050 from a 2018 base year.

These SBTi targets are set (50% reduction by 2030 and net zero by 2050) to meet the Paris Climate Agreement goal of limiting Temperature change to 1.5 C.

OEKO-TEX 100 Certified – Non-PFAS

+ Do your products carry the OEKO-TEX 100 certification, one of the world's best-known labels for textiles?

+ This certification signifies that products have been tested and found to contain no harmful substances, including PFAS chemicals.

+ Effective Jan. 1, 2023, all textile products developed by Milliken & Company will not contain any intentionally added PFAS chemistries, and other companies will likely follow.

OEKO-TEX®
CONFIDENCE IN TEXTILES
STANDARD 100

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Sustainability Summary

The sustainability of FR clothing is an important issue that needs to be considered. By using comfortable, more sustainable (durable) materials, eco-friendly manufacturing methods (GHG emission reduction) and more closely evaluating the materials used on a molecular level (non PFAS), companies can greatly improve the sustainability of their FR clothing program.

Working with credible, eco-friendly FR/AR fabric/clothing manufacturer also impacts your organization's Scope 3 GHG Emission reduction efforts.

Trust: PPE Best Practices

Types of AR/FR Clothing and PPE Programs

TASK-BASED

+ Proper FR/AR clothing is put on to perform a specific task.

DAILY WEAR

+ Proper AR/FR clothing is worn at all times during work hours.

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Risk Assessment/Risk Management

+ **Risk**: Hazard(s), consequences, likelihood of consequences

+ **Risk Management:** Reduce risk to “ALARP” (as low as reasonably practicable)

Likelihood of Consequences:

1. Qualified person
2. Human error – NFPA 70E – “state” of qualified person – human performance
3. History and current status of equipment

Routine Tasks and Complacency

A significant amount of arc flash incidents occur involving either brand-new employees or the more-experienced employees.

Cultural Risk with Task Based PPE Programs

+ Routine tasks – PPE category 1 and 2 type tasks: Will workers consistently don PPE at the appropriate time? Complacency!

+ Normalization of deviance: the gradual process through which unacceptable practices and standards become acceptable. As the deviant behavior is repeated without catastrophic results, it becomes the social norm of the organization.

Cultural Risk with Task Based PPE Programs (Cont.)

+ Complacency is usually one of the root causes of electrical incidents at 480V

+ Although it is considered low voltage, 480V equipment is a leading killer in the electrical industry

+ FR/AR daily wear clothing is a SEAT BELT

Potential Task-Based Scenario—Bank Arc Flash

Real Life Arc Flash Caught on Surveillance Camera: Daily Wear—Westex UltraSoft®

Thank you.

Questions?

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