



Standards Comparison

In the safety apparel industry there are many technical standards that are quoted when people are referring to Personal Protective Apparel for protection from Electrical Arc Exposure or Hydrocarbon Flash Fire. The standards listed below are a representation of the various standards that we commonly see quoted by various manufacturers. Listed below are the correct standard number, name and scope of each. Also provided is a brief description of each one and how it relates to Ranpro products.

NFPA 1975 – “ Standard on Station/Work Uniforms for Fire and Emergency Services”

Sec 1-1.1 Scope

This standard shall specify the minimum performance and certification requirements and the test methods for textiles and other materials used in the construction of station/work uniforms for fire and emergency services personnel.

The intent of this standard is to identify and test garments that a fire or EMS worker would use on a daily basis such as uniforms (shirts, pants, coveralls etc.).

Tests required

Industrial Washing and Drying

Commercial Dry Cleaning

Heat and Thermal Shrinkage Test for fabric and hardware

Thread heat Resistance Test

This standard has requirements for seam strength as well and specifically notes woven and knitted fabrics. It does not refer to coated fabrics in any way. This standard also requires independent third party certification of your garment to this standard. Since our garment is not “Station/Work uniforms for Fire and Emergency Services” it would not make sense to try and have it certified.

In review the main things that we could carry from this standard is the Thermal Heat Resistance component. This needs to be done for both the thread and the fabric. This is done with the CGSB 155.20 standard now. In my opinion our Petro-Gard suits would have no problem in passing the Thermal heat resistance tests of this standard. We use all NOMEX thread in our Petro-Gard garments and our fabric is a “Low Smoke” Neoprene coated on a NOMEX IIIA woven substrate.

NFPA 70E

“Standard for Electrical Safety– Requirements for Employee Workplaces”

1-1.1 Scope

1-1.2 This standard addresses those electrical safety requirements for employee workplaces that are necessary for the practical safeguarding of employees in their pursuit of gainful employment. This standard covers the following: Electrical conductors and equipment installed within or on buildings or other structures, including mobile homes and recreational vehicles, and other premises such as yards, carnival, parking, and other lots, and industrial substations.

1-1.3 Conductors that connect the installations to a supply of electricity

As you can see, the scope of this standard or specifications is intended to deal with safe working practices in the above noted circumstances. However, there is a section in this standard that deals with PPE in a limited way.

Chapter 3 Personal and Other Protective Equipment

General

Employees working in areas where there are electrical hazards shall be provided with, and shall use, protective equipment that is designed and constructed for the specific part of the body to be protected and for the work performed.

This deals with the fact that workers need to wear the appropriate protection when doing certain jobs. An example of this is the following:

3-3.6 Hand and Arm Protection

Employees shall wear rubber insulating gloves where there is a danger of hand and arm injury from electric shock and burns due to contact with live parts. Hand and arm protection shall be worn where there is a possible exposure to arc flash burn. Arm protection shall be accomplished by apparel described in 3-3.5 of part II.

There is a section on “Clothing Material Characteristics” but it deals specifically with the types of fabrics for shirts, pants and coveralls. It focuses on cotton, poly-cotton, silk, wool and nylon fabrics as wells as FR treated cottons, aramid fabrics and PBI fabrics.

It basically states that a fabric shall not ignite and continue to burn when subjected to the arc conditions to which it will be exposed.

The only area that refers to rainwear is the following:

3-3.9.4.2 Outer Layers. Garments worn as outer layers over FR clothing, such as jackets or rainwear, shall also be made from FR material.

Since our Petro-Gard fabric meets the requirements for ASTM F1891 “Arc and Flame Resistant Rainwear” It certainly would be OK to use in compliance with NFPA 70E.

NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

Scope 1-1.1 Test Method 1 shall apply to fabrics or other materials used in curtains, draperies, or other window treatments. Vinyl coated fabric blackout linings shall be tested according to Test Method 2

1-1.3 For the purpose of Test Method 1, the terms curtains, draperies or other window treatments, where used, shall include, but not be limited to the following items:

1. Window curtains
2. Stage or theatre curtains
3. Vertical folding shades
4. Roll-type window shades
5. Hospital Privacy curtains
6. Window draperies
7. Fabric vertical shades or blinds
8. Horizontal folding shades
9. Swags
10. Fabric horizontal shades or blinds

As you can see the above standard has nothing to do with clothing, rainwear or any other type of PPA. Test methods in this standard could have been used in the past to evaluate vinyl or PVC rainwear.

NFPA 2112

Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire

This standard is similar to the Canadian CGSB 155.20 standard that is summarized later in this comparison.

1.1 Scope

This standard shall specify the minimum design, performance, certification requirements, and test methods for flame -resistant garments for use in areas at risk from flash fires.

This standard uses various tests to ascertain the ability of a fabric and garment to withstand the stress of a hydrocarbon flash fire while offering protection and not contributing to burn injury.

This is accomplished through the following tests:

Test Requirements

Required to meet a minimum Thermal Protection (TPP- Thermal Protective Performance. The heat a fabric stops from penetrating to the skin)

- Fabric shall be tested for flame resistance
- Must be tested for thermal shrinkage

- All thread, excluding embroidery thread, shall be tested for heat resistance
- Hardware shall be tested for heat resistance
- Garments shall be tested in a simulated flash fire on an instrumented mannequin

Summary

This standard is very similar to the CGSB 155.20 standard with the exception of the Instrumented Mannequin test. Although some of the testing procedures are slightly different, our Petro-Gard fabric can pass and attain certification for the performance criteria in this standard. However, this standard does not directly refer to the outermost garment that a worker would wear as stated in the CGSB 155.20 standard. Therefore, I believe that this standard is more applicable to work clothing.

ASTM F1506 “ Standard Performance for Textile Materials for Wearing Apparel for Use by Electrical Workers Exposed to Momentary Electric Arc and Related Thermal Hazards.

This standard is designed for work clothing or everyday clothing that electrical worker would use. It has testing and specifications that are unique to woven and knit fabrics. It should not be used to reference rainwear.

ASTM has a specification that is specific to Rainwear:

ASTM F1891 “Standard Specification for Arc and Flame Resistant Rainwear”

Our Petro-Gard fabric meets this requirement

ASTM F1891 “Standard Specification for Arc and Flame Resistant Rainwear”

1. Scope

- 1.1 This specification establishes applicable test methods, minimum physical and thermal performance criteria, a suggested sizing guide, and suggested purchasing information for rainwear for use by workers who may be exposed to thermal hazards of momentary electric arcs and open flames
 - 1.1.1 This specification does not apply to the electrical contact hazards or electric shock hazards involved with electric arcs.
 - 1.1.2 This specification does not apply to flash fire hazards such as industrial hydrocarbon flash fires or other petrochemical flash fire hazards.
- 1.2 The objective of this specification is to prescribe fit, function and performance criteria for rainwear that meets a minimum level of thermal and physical performance when exposed to a laboratory-simulated electric arc or flame exposure.

This standard, as it states, was specifically developed for rainwear that is potentially exposed to electric arc. It **does not** deal with rainwear that potentially can be exposed to flash fire.

This is because there are fabrics available that work well in an electrical arc exposure application but will not work well in a flash fire. There are, however, fabrics that will perform well in both scenarios (Electrical Arc and Flash Fire) and one is the Petro-Gard “Low Smoke” Neoprene/NOMEX IIIA.

CGSB 155.20 “Workwear for Protection Against Hydrocarbon Flash Fire”

1. Scope

- 1.1 This standard states the minimum requirements for performance of workwear worn for protection against unplanned exposure to hydrocarbon flash fire.
 - 1.1.1 This standard establishes performance requirements and test methods for evaluation of components used to construct workwear.
 - 1.1.2 Workwear, meeting this standard is intended to provide a degree of protection to the wearer and reduce the severity of injury should a hydrocarbon flash fire occur. For the purpose of this standard, “Protective” does not mean that a wearer will suffer no burns if exposed to flash fire while wearing workwear meeting this standard.
 - 1.1.3 This standard refers to the protective workwear that will be worn as the outermost garment.
 - 1.1.4 This standard refers to protective workwear that individually or in combination covers the body from the neck to the wrists and feet, that may or may not cover the neck, head, hands or feet.
- 1.2 This standard does not apply to specialized protective clothing such as proximity suits, fire fighters protective clothing and fire entry clothing. It is not intended to establish requirements of or the protection from chemical, radiological or biological hazards.

This standard uses various tests to ascertain the ability of a fabric and garment to withstand the stress of a hydrocarbon flash fire while offering protection and not contributing to burn injury. This is accomplished through the following tests:

Type 1 single layer

Flame Resistance (Vertical Flame Test)

Heat Resistance (Oven Test)

Thermal Protection (TPP–Thermal Protective Performance. The heat a fabric stops from penetrating to the skin)

Thermal Shrinkage Resistance (Measured at time of heat resistance test)

Type 2 Multi layer

Same test except the multi layered fabrics are tested together

Thread & Hardware

Heat Resistance

Primary Closure

Flame Resistance, Heat Resistance

Our Petro-Gard fabric meets these requirements as is designated within this standard. It is interesting to note that the scope of this standard refers to the “outermost garments” which would include rainwear.

To my knowledge, this standard along with the ASTM F1891 that is mentioned above are the only two that deal with testing parameters for outer garments including rainwear.

Summary

The standards that are noted above are a representation of the ones that you are most likely to encounter. It is important to remember that no one standard can provide you with a garment that will work in all areas. This is exactly the point of having various specific standards that address the unique hazard exposures of each job. The electrical arc hazard that a lineman is exposed to is much different than a hydrocarbon flash fire hazard that a petrochemical worker is exposed to. Some fabrics can perform both rolls while others are very hazard specific therefore, it is imperative that you understand the demands and risk level of the end user.

There is also basic industrial PVC or Polyurethane coated fabrics that are stated as being FR (Flame Resistant). These fabrics will only offer basic protection from “Momentary protection from Open Flame” and are **not** intended for the high-risk jobs mentioned above. A garment made from this type of FR fabric would only be acceptable in areas where these risks do not exist. (Such as a roofer, paver, Telecom worker etc.) Remember that PPA really needs to be job fit to the risk level. A simple FR designation cannot fit in all applications; you really need to understand the end use.

I hope this helps to clarify some of the fog that we see in today’s Protective Apparel market however if you have any questions or comments please do not hesitate to contact us.

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