

## White Paper

# What's in a Word:

## Inherent Fabric, Treated Fabric, and What They Mean in the World of Flame Resistant Fabrics

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In the protective clothing market, there are a host of choices to make when specifying personal protective equipment (PPE). Arc-rated/flame resistant (AR/FR) fabrics, which form the foundation of bodywear PPE and largely dictate the level of protection achieved, come in numerous formulations, all with their own

set of characteristics. Even within a specific type of AR/FR fabric, characteristics like arc rating and comfort properties can vary greatly among brands. The white paper explores this technical industry so that you can select a reliable, functional FR fabric to serve as the foundation of your protective clothing needs.

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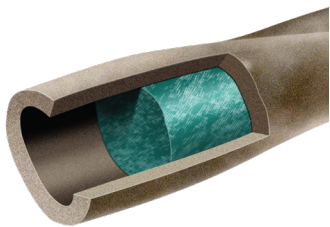
“By understanding the real differences among FR technologies and how these distinctions impact performance, safety managers can navigate the complex world of AR/FR fabrics to make informed decisions based on real differentiators.”

It is easy to allow simplified terms like “inherent” or “treated” to guide you during the FR specification process. Developed to oversimplify a necessarily technical process, inherent and treated labels can persuade a purchaser, and may detract from the full scope of information needed to make this important decision. Drawing on our insights as one of the few FR fabric manufacturers in the world developing the full spectrum of AR/FR fabrics, we see first-hand that these qualities are only a small part of the specification process. By understanding the real differences among FR technologies and how these distinctions impact performance, safety managers can navigate the complex world of AR/FR fabrics to make informed decisions based on real differentiators.

## Understanding the Terms Inherent and Treated

Born out of the desire to describe different approaches to producing AR/FR fabrics, the terms inherent and treated are thought to classify flame resistant fabric. Inherent fabrics tend to be aramid fabrics and fabrics where the flame-resistant properties are engineered into the fiber before the fabric is woven. Treated fabrics are typically cotton or cotton-based fabrics, which are engineered to be flame resistant after the fabric is woven.

Originating more than 30 years ago, these terms helped describe the difference in how the two categories of FR fabrics were produced. At that time, inherent fabrics lasted longer than those considered to be treated fabrics. As technology advanced, however, these classification terms remained and now inadvertently misconstrue the benefits of today’s fabrics. “Treated” fabric technology, when engineered correctly by a reputable manufacturer, embeds the flame resistant properties of cotton-based fabric into the core of the cotton fiber, providing FR protection that is guaranteed to last for the useful life of the garment—just like fabrics considered to be “inherent.”



### The Westex Difference

FR properties are embedded directly into the fibers.

With these strides in FR fabric technology, very little guidance has been put into place to properly categorize FR fabrics as inherent or treated. In fact, the definition of inherent has become so blurred that it is used to describe any fabric that contains some fibers engineered for flame resistance in the fiber stage, as there is no defined percentage required by the industry. What was once a meaningful way to categorize fabrics no longer accurately reflects the value propositions of each category of FR fabrics. Wearers should be evaluating FR fabric based on definable metrics like protection classifications to meet industry standards, comfort and performance needs for workers, and job site-specific parameters.

## The Science Behind FR

Trusted FR fabric manufacturers are united by their ability to deliver consistent protection with every bolt of FR fabric. No matter the process, branded FR fabric is known by reliable performance and backed by a brand’s reputation.

Fabric can be engineered to acquire FR properties at the fiber development stage

or during the fabric creation stage. The primary FR fiber or fabric technologies use chemistry and fire science knowledge to interrupt the combustion process to create FR fabrics with excellent flame-resistant durability. Once these technologies are applied, the FR characteristics are permanently embedded into the fabric and will not wash out or wear out over the course of the garment's lifetime, when cleaned and properly maintained per the manufacturer's fabric care instructions. As such, the value proposition of engineered FR fabrics becomes a matter of comfort, user preference, and consensus standard performance, rather than lasting FR protection.

## Evaluating Your FR Fabric Selection

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All FR fabrics in the industry meet one or more of the industry consensus standards; in fact, in order for garments to adhere to NFPA 70E or NFPA 2112, the fabric must meet applicable ASTM and NFPA standards performance criteria. ASTM F1959: Standard Test Method for Determining the Arc Thermal Performance Value of Materials for Clothing and ASTM F1930: Standard Test Method for Evaluation of Flame Resistant Clothing for Protection Against Fire Simulations Using an Instrumented Manikin are both fabric test methods for evaluating protective fabric performance for baseline arc flash and flash fire protection. It is important to note that even if two fabrics meet the same industry consensus standard, their performance can vary widely within an acceptable range—so choosing a fabric that best meets your specific needs becomes a critical component.

Keeping this performance indicator in mind, the key then to specifying a quality AR/FR fabric for any protective garment is to analyze the hazards employees are facing and to account for the environment in which they face it. From there, it is a matter of choosing the best fabric to protect those who are entrusting their safety to you. Scientific test results—not simplified marketing descriptions—should dictate fabric decisions.

When specifying FR fabric for protective garments, here are five key criteria to consider:

### Does the fabric meet my hazard requirements?

Like the oversimplified usage of “inherent” and “treated” in the market, standard certification can also be exaggerated. Terms like “NFPA 2112-certified” and “Cat 2”—initially intended to helpfully indicate a product met certain standards—inadvertently cause more confusion among users. It is not enough to know that a fabric meets the standard for your specific hazard; you also want to know how the fabric performs under hazardous conditions. Reviewing things like body burn percentages helps provide a clearer picture of how the fabric performs beyond the baseline provided by the standard.

### How does the fabric perform in laboratory evaluation?

Proven fabric brands are known for consistency in the market and regularly evaluate the performance of each lot of fabric they produce. While meeting consensus standards are an important threshold, it is just that—a minimum performance indicator. Fabrics can meet standards and still vary widely in their

## AR/FR Clothing Programs Start with Fabric

Safety and comfort come from the fabric brand — not the garment brand.

Select a trusted fabric brand that best meets your needs

Specify the fabric in your garments, even with name-brand garments

Avoid garments where the fabric brand isn't identified

Learn more about the fabric manufacturer's quality control — how is each fabric lot tested?

Understand the FR fabric's certification and ask for third-party test results

performance within that standard. Request the test data to better understand the fabric's performance, and when it is time to order FR garments, specify FR fabric by name.

### How does the fabric perform in the real world over time?

In addition to laboratory evaluation, consider how FR fabrics perform in real-world settings. This can be analyzed in several ways—from the actual incidents where FR fabrics protected a wearer to how the fabric holds up over time. Dedicated to increased accountability for fabric performance, Westex® by Milliken® is proud to be the first manufacturer in the industry to test fabrics in real-world situations, in addition to the controlled environment of industry standards testing.

### Does the fabric demonstrate performance and longevity characteristics important to me?

Understanding fabric characteristics like long-term shrinkage, color wash down, abrasion or durability can help you understand a garment's performance and longevity. If a garment is specified with reputable FR fabric and is cared for properly, the concern of FR durability is diminished. Instead, consider characteristics like garment shrinkage, or fading or tearing over time, which can impact the life of a garment. Taking into account your workplace needs, like whether durability demands justify investing in more expensive fabric initially, will help inform what type of investment makes the most sense.

### Will my employees want to wear it?

Investing in FR clothing is critical to protecting your employees; however, it is only beneficial if worn and worn properly. One key area to consider is the comfort and performance attributes of the fabric given your work environment. For example, there are fabrics offering greater flexibility for wearers; fabrics with moisture management and wicking properties well suited to humid environments; fabrics enabling better corporate brand appearance; and fabrics designed to look and feel like everyday streetwear. Prioritize characteristics that will help create a want-to-wear experience for your workers.

As one of the few FR fabric manufacturers in the world producing aramid, cotton-rich, and blend FR fabrics, we strongly recommend that FR clothing program decisions be guided by a holistic approach, rather than relying solely on inherent or treated classifications. Much of your decision should be guided by a host of technical criteria—prioritizing fabric performance above all to arrive at an FR fabric selection best suited for your unique needs.

## About the Author:

Scott Francis is the Technical Manager for Westex by Milliken. Involved in the safety industry for nearly 30 years, Scott has extensive knowledge of FR hazards, standards, fabrics and clothing. He has addressed end users, associations, and garment suppliers thousands of times regarding relevant safety topics.



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