# OUR PROFILE

## PT. SAHABAT UTAMA SUKSESINDO

## WESTEX BY MILLIKEN

## FIRE HAZARDS PROTECTION

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**Westex,** established in 1919, has over a half century of experience producing flame resistant fabrics. Westex continues to hold a dominant position as the world's largest producer of durable flame resistant cotton and cotton blended fabrics.

# THE POWER OF 3

## One Company. One Priority. You.

**Milliken & Westex** are now one company with one singular focus: to provide innovative fabrics for the FR industry that deliver on our commitment to worker safety, comfort and long-term durability.

**100 PhDs**

**5,000 GLOBAL PATENTS**

**50 YEARS OF FR FABRIC EXPERTISE**

**149 YEARS OF PURPOSEFUL INNOVATION**


WESTEX®
by Milliken

**Westex has made a commitment to continual improvement of protective fabrics through innovative research and development. Our strong commitment to inventory, coupled with over 2.000.000 square feet of manufacturing and warehousing in two domestic facilities and three state-of-the-art production lines, allows Westex to provide unparalleled, worldwide support to the protective clothing marketplace.**


**866.493.7839 WESTEX.COM**

2845 W. 48th Place Chicago, IL 60632 USA

WESTEX®

*A WORLD LEADER IN FLAME RESISTANT FABRICS*

# A world leader in flame resistant fabrics

## THE WESTEX DIFFERENCE

Westex is the world's largest producer of durable flame resistant cotton and cotton blended fabrics. Because we're leaders in the industry, we're obligated and committed to not only produce superior flame resistant fabric, but also to serve as a knowledgeable source of everything flame resistant. So we make a point of advancing education of our industry to the people who need it most — fabric purchasers and the workers that wear our fabric.

Our strict focus on progress does not end with education. Because even though we engineer the leading flame resistant fabrics in the industry, we can always work toward further improvements — and we do just that. As we discover and develop new flame resistant technology and enhanced comfort, we adopt best practices and adapt the newest advancements to our processes.

## UNCOMPROMISING PROTECTION, UNPARALLELED COMFORT

Westex flame resistant fabrics have market-proven protection against electric arc flash, flash fire and molten metal hazards. Through years of innovation, Westex UltraSoft® and Indura® fabrics provide the natural comfort characteristics of cotton. Because when flame resistant fabric is comfortable for the wearers, they will be more likely to wear the attire — and more likely to wear it properly. We guarantee these fabrics to retain their flame resistance for the life of the garment — giving purchasers and workers total peace of mind. And now we are raising the bar even higher with the introduction of UltraSoft AC® — the most comfortable flame resistant fabric ever made.

## LEADERSHIP AND PRODUCTS TRUSTED WORLDWIDE

With a network that spans the globe and products that are used all over the world, Westex is an acknowledged leader. But we don't take this position for granted. We are always striving to provide technical and educational information on the industry standards and flame resistant clothing. It's insight and support that our customers appreciate — and it's one of the many reasons they put their trust in Westex UltraSoft®, UltraSoft AC® and Indura® fabrics. It's all part of our commitment to offering the highest quality flame resistant fabrics in the world.


***Westex Plant — Georgia, USA***
*Phil Gully, FR Line Supervisor*
*38 Years of Service*

# RAISING THE BAR ON PROTECTION, COMFORT AND VALUE BECAUSE JUST MEETING THE STANDARDS IS NOT ENOUGH

At Westex, we understand how complex it is to engineer a fabric that can support a true guarantee of flame resistance for the life of the garment. With tens of millions of yards shipped over 20 years, UltraSoft® and Indura® brand fabrics have delivered on this guarantee under the harshest test conditions and, more importantly, in the field. When you combine this high level of protection with our proprietary fabric softening process and double-shrunk technology, it's easy to understand why thousands of end users globally have specified Westex fabrics.

Our proprietary technology gives us complete control over safety and comfort — from start to finish. The Westex difference extends beyond the critical engineering technology to internal and external testing and unmatched technical support.

Westex advanced engineering technology includes:

- **Westex Flame Resistant Guarantee** — To deliver on this guarantee, we use proprietary engineering processes involving a special fabric-preparation process; specialized, custom-engineered equipment; several additional steps in the multi-step FR engineering process; computer monitoring equipment; and extensive laboratory testing.
- **Specialized Softening Process** — For ultimate softness and comfort, we put our fabrics through a multi-step softening process. This unique procedure gives us the industry's preferred fabric feel and natural cotton comfort.
- **Double-Shrunk Technology** — Our proprietary double-shrunk technology is far superior to any other process utilized today. This advanced technology is engineered into every yard of UltraSoft®, UltraSoft AC® and Indura® fabric.

### UltraSoft®

88% Cotton,
12% High Tenacity Nylon

UltraSoft® was first introduced in 1996. Today, UltraSoft® brand flame resistant fabrics are specified by thousands of end-user companies in many industries around the world. With millions of garments in service worldwide, UltraSoft® has a strong reputation for providing an excellent balance of protection, comfort and value.

### UltraSoft AC®

88% Pima Cotton,
12% High Tenacity Nylon

Introducing the world's most comfortable flame resistant fabric yet — UltraSoft AC®. Developed with the same proven Westex technology, UltraSoft AC® provides advanced comfort with long-staple pima cotton to further enhance cotton's natural comfort characteristics, added strength and improved appearance after laundering.

### Indura®

100% Cotton

Indura®, introduced in 1987, was the first cotton fabric guaranteed flame resistant for the life of the garment. Since 1987, millions of garments made with Indura® have been installed in successful protective clothing programs worldwide. Indura® is still popular in the metal industry and with budget conscious contractors.

## QUICK FACTS

- Since 1996
- Guaranteed flame resistance for the life of the garment
- Soft feel for enhanced comfort
- Enhanced protection from electric arc and flash fire exposures
- Multipurpose protection from electric arc flash, flash fire, molten ferrous metal and welding exposures
- 75%+ extended garment wear life
- Double-shrunk technology
- Excellent value equation

# UltraSoft®

The **UltraSoft®** line of flame resistant 88% cotton, 12% high tenacity nylon fabrics, introduced in 1996, is guaranteed flame resistant for the life of the garment in either high temperature industrial or home washing procedures. The fabric is engineered to focus the excellent abrasion resistance of the nylon on the outer surface to enhance garment wear life, while the cotton fibers are focused towards the skin to optimize comfort. In addition, UltraSoft® fabrics are engineered to have an extremely soft feel to further enhance the superior comfort properties of cotton. UltraSoft® fabrics are fully flame resistant and the 12% nylon actually enhances the protective performance in some cases, such as electric arc and flash fire exposures.

### ULTRASOFT® IS AVAILABLE IN THE FOLLOWING STYLES:

| UltraSoft® 88% Cotton, 12% High Tenacity Nylon Woven Fabrics | | | | |
|---|---|---|---|---|
| STYLE | WEIGHT | WEAVE | ATPV (cal/cm²) | NFPA 70E HAZARD RISK CATEGORY (HRC) |
| 301 Shirt/Lt. Wt. Coverall Twill | 7 oz (237 g/m²) | Twill | 8.7 | 2 |
| 451 Pant/Coverall Twill | 9 oz (305 g/m²) | Twill | 12.4 | 2 |
| 331 Chambray Denim Shirting | 5.5 oz (186 g/m²) | Twill | 6.0 | 1 |
| 341 Lightweight Shirting Twill | 5.5 oz (186 g/m²) | Twill | 6.1 | 1 |
| 881 Basketweave | 8 oz (271 g/m²) | Basketweave | 9.8 | 2 |
| 391 Denim | 13 oz (440 g/m²) | Denim Twill | 19.5 | 2 |
| 801 Heavyweight Sateen | 13 oz (440 g/m²) | Sateen | 21.0 | 2 |
| 961 Duck | 11 oz (372 g/m²) | Duck | 12.7 | 2 |

| UltraSoft® 88% Cotton, 12% High Tenacity Nylon Knit & Fleece Fabrics | | | | |
|---|---|---|---|---|
| STYLE | WEIGHT | WEAVE | ATPV (cal/cm²) | NFPA 70E HAZARD RISK CATEGORY (HRC) |
| 130 Interlock Knit | 6 oz (203 g/m²) | Interlock Knit | 10.9 | 2 |
| 131* Rib Knit | 6.5 oz (220 g/m²) | Rib Knit | 12.1 | 2 |
| 180 Fleece | 11 oz (372 g/m²) | Fleece | 17.9 (Ebt) | 2 |
| 181* Rib Knit | 10.5 oz (355 g/m²) | Rib Knit | 24.7 | 2 |

* Content = 86% cotton, 12% high tenacity nylon, 2% spandex

## QUICK FACTS

- New 2011
- Guaranteed flame resistance for the life of the garment
- Advanced comfort of cotton
- Pima cotton softness
- Enhanced protection from electric arc and flash fire exposures
- Multipurpose protection from electric arc flash, flash fire, molten ferrous metal and welding exposures
- 75%+ extended garment wear life
- Double-shrunk technology
- Excellent value equation

# UltraSoft AC®

**UltraSoft AC®** is the next evolution of the UltraSoft® family of fabrics. UltraSoft AC® is a line of flame resistant 88% pima cotton, 12% high tenacity nylon fabrics that is guaranteed flame resistant for the life of the garment in either high temperature industrial or home washing procedures. With the finest long-staple pima cotton and advanced softening technology, UltraSoft AC® will prove to be the most comfortable flame resistant fabric on the market. When your biggest obstacle is comfort, UltraSoft AC® is the innovation to meet your employees' needs.

### ULTRASOFT AC® IS AVAILABLE IN THE FOLLOWING STYLES:

| UltraSoft AC® 88% Cotton, 12% High Tenacity Nylon | | | | |
|---|---|---|---|---|
| STYLE | WEIGHT | WEAVE | ATPV (cal/cm²) | NFPA 70E HAZARD RISK CATEGORY (HRC) |
| 901 Shirt/Lt. Wt. Coverall Twill | 7 oz (237 g/m²) | Twill | 8.3 | 2 |
| 951 Pant/Coverall Twill | 9 oz (305 g/m²) | Twill | 11.7 | 2 |

## QUICK FACTS

- Since 1987
- Guaranteed flame resistance for the life of the garment
- Multipurpose protection from electric arc flash, flash fire, molten ferrous metal and welding exposures
- Double-shrunk technology
- Lower initial cost
- Comfort of cotton

# Indura®

Westex's original **Indura®** line of flame resistant 100% cotton fabrics, introduced in 1987, is guaranteed flame resistant for the life of the garment in either high temperature industrial or home washing procedures. In fact, the Indura® brand name was derived from "industrial (wash) durability," due to the fact that Indura® was the first flame resistant cotton fabric that was engineered to provide guaranteed flame resistance. Since the introduction of Indura® in 1987, millions of garments have been installed in successful protective clothing programs worldwide. Today, Indura® is still popular for use in denim jeans, jackets and pants in the metals industry and in coveralls for budget conscious contractors.

### INDURA® IS AVAILABLE IN THE FOLLOWING STYLES:

| Indura® 100% Cotton Wovens | | | | |
|---|---|---|---|---|
| STYLE | WEIGHT | WEAVE | ATPV (cal/cm²) | NFPA 70E HAZARD RISK CATEGORY (HRC) |
| 30 Shirting Twill | 7 oz (237 g/m²) | Twill | 7.7 | 1 |
| 45 Twill | 9 oz (305 g/m²) | Twill | 10.8 | 2 |
| 85 Sateen | 9 oz (305 g/m²) | Sateen | 11.5 | 2 |
| 306 Denim | 12 oz (406 g/m²) | Denim Twill | 14.4 | 2 |
| 308 Denim | 14 oz (473 g/m²) | Denim Twill | 18.3 | 2 |
| 315 USS Whipcord | 12 oz (406 g/m²) | Whipcord | 12.9 | 2 |

All arc ratings are based on independent tests conducted at Kinectrics per ASTM F1959

## END-USE APPLICATION

Today, UltraSoft® brand flame resistant fabrics are specified by thousands of end-user companies in many industries around the world. With millions of garments in service worldwide, UltraSoft® has a strong reputation for providing an excellent balance of protection, comfort and value. Licensed manufacturers use UltraSoft® and UltraSoft AC® to produce garments for electric arc flash protection in electric utilities and electrical maintenance; for protection from flash fire in the oil, gas, chemical and petrochemical industries; and for protection from molten ferrous metal splash in steel mills and foundries. They are also used in military, wildland firefighting and tactical clothing applications.

## CARE AND MAINTENANCE

UltraSoft®, UltraSoft AC® and Indura® brand fabrics have been designed to withstand the most rigorous industrial laundering conditions anticipated for proper cleaning of work clothing. Westex guarantees the flame resistance of UltraSoft®, UltraSoft AC® and Indura® fabrics for the useful life of such garments when proper care procedures are employed. It's important to recognize that the thermal protective properties of any flame resistant fabric can be compromised by the presence of contaminants in the fabric from which the garment is made. Please contact Westex or visit westex.com for a detailed cleaning and maintenance guide.

# PROPRIETARY STATE-OF-THE-ART

## Westex guarantees the flame resistance of UltraSoft®, UltraSoft AC® and Indura® fabrics for the life of the garment.

This guarantee has been demonstrated in laboratory testing and through the auditing of samples from the millions of garments in the protective clothing marketplace for over two decades. There are many "unseen" details that go into the production of durable flame resistant cotton and cotton blend fabrics. This starts with the production of the base material, dyeing, preparation, FR engineering process, internal laboratory testing, external laboratory testing and technical support, all the way to the proven performance of the flame resistant fabric in the market. We have spent decades perfecting the highly technical, proprietary flame resistant fabric technology to produce our trusted fabrics, which are market-proven, world-leading brands. This high level of performance is achieved by Westex's proprietary production process, which combines advanced, custom-engineered machinery with sophisticated computer equipment to conduct the "ammonia cure" system.

## CONTROL FROM START TO FINISH

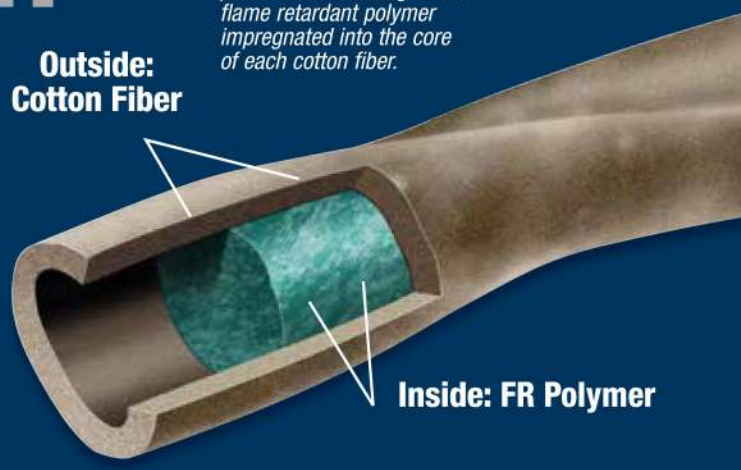
WESTEX® Proprietary Technology

WESTEX® Proprietary Technology

| DEVELOP CUSTOM-ENGINEERED SPECIFICATIONS | SPIN FIBERS TO YARNS | WEAVE FABRIC | DYE FABRIC | SPECIAL PREPARATION PROCESS | SPECIALIZED MULTI-STEP TECHNOLOGY |
|---|---|---|---|---|---|
| Westex's strict custom-engineered specifications for the construction of the base fabrics are designed to work well with the Westex FR engineering process and optimize wear performance. | UltraSoft® and UltraSoft AC® fabrics contain very specialized high tenacity nylon fibers that have excellent abrasion resistant properties. These fibers are intimately blended with cotton fibers and spun using ring-spinning technology to produce the highest strength fabric possible. | Westex base fabrics are woven to focus the excellent abrasion resistance of the nylon on the face of the fabric to enhance garment wear life, while the cotton fibers are focused towards the skin to optimize comfort. | UltraSoft®, UltraSoft AC® and Indura® fabrics are dyed using the highest quality dyes available for cotton fabrics to assure optimal lightfast and colorfast performance on a consistent basis. | Westex employs advanced proprietary fabric preparation steps that specifically prepare the fabrics for the Westex engineering process. | The details of Westex's engineering process are proprietary but, in part, the specialized technology involves a special fabric-preparation process, custom-engineered equipment, several additional steps in the multi-step FR engineering process, computer monitoring equipment and extensive laboratory testing. |

# WESTEX TECHNOLOGY

In the Westex engineering process, a high-quality phosphonium salt precondensate flame retardant chemical is applied and polymerized with gaseous ammonia forming a long-chain flame retardant polymer impregnated into the core of each cotton fiber. This flame retardant polymer acts as a catalyst promoting the charring of the fabric. This accelerated charring prohibits the support of combustion by reducing the fuel source. The flame retardant chemical acts in the solid phase to produce this char. Please contact Westex or visit westex.com for a detailed UltraSoft®, UltraSoft AC® and Indura® cleaning and maintenance guide.




*The Westex engineering process forms a long-chain flame retardant polymer impregnated into the core of each cotton fiber.*

WESTEX® Proprietary Technology

WESTEX® Proprietary Technology

| MULTI-STEP FABRIC SOFTENING | DOUBLE-SHRUNK TECHNOLOGY | INTERNAL TESTING & DOCUMENTATION | EXTERNAL LABORATORY TESTING | SHIP FABRIC TO LICENSED CUSTOMER | TECHNICAL SUPPORT AFTER THE SALE |
|---|---|---|---|---|---|
| Westex's proprietary multi-step fabric softening process involves a unique balance of chemical and mechanical procedures. The advanced technology provides dramatically improved softness and comfort. | Westex's proprietary double-shrunk technology is far superior to any other process utilized today. This advanced technology is engineered into every yard of UltraSoft®, UltraSoft AC® and Indura® fabric. | Westex has a government-certified laboratory with a full staff of experienced technicians who administer a full battery of tests consistently throughout each production lot. The test reports, along with retained samples from the lot, are filed in Westex's laboratory and available for inspection. | Westex has committed a large annual budget on an ongoing basis to independent testing to fully evaluate electric arc flash performance and flash fire performance of UltraSoft®, UltraSoft AC® and Indura®. | Westex requires all customers to sign a Sales & Trademark License Agreement, which requires, in part, for the garment manufacturer to sew an UltraSoft®, UltraSoft AC® or Indura® label into the garment to allow the end user to easily identify the brand of fabric that was used to produce the garment. | Westex is fully committed to the protective clothing marketplace and we stand behind every yard of UltraSoft®, UltraSoft AC® and Indura® sold. We offer comprehensive technical assistance to our customers, distributors and end users both before and after the sale. |

*Each year, millions of garments made with Westex brand fabrics are being specified and worn by workers around the world.*

# FLAME RESISTANT (FR) CLOTHING BASICS

Flame resistance is the characteristic of a fabric that causes it to self-extinguish when the source of ignition is removed. The most commonly used test method is ASTM D6413* Standard Test Method for Flame Resistance of Textiles (Vertical Test). The vertical flame test is a test method with no pass/fail requirements. Industry-established standards range from 4" to 6" (100 mm to 150 mm) maximum char lengths. It is very important for flame resistant fabrics to self-extinguish. Fabrics that self-extinguish after the source of ignition is removed can dramatically reduce body burn percentage and increase the chance for survival. However, char length measurements by themselves have no correlation to the protection afforded by a flame resistant fabric. True protection to thermal events is better measured by testing the thermal resistance of fabrics against exposures to simulated hazards, such as the flash fire manikin test or the arc thermal performance test — both of which we perform on a regular basis.

### ASTM D6413

*Vertical flame test on non-flame resistant fabric*

*Vertical flame test on UltraSoft® fabric*

*"Although passing the vertical flammability requirements is an essential criterion for protective clothing fabrics, it is only one of a battery of tests that fully describes the protective characteristics."*

## PRIMARY VS. SECONDARY PROTECTIVE CLOTHING

### EXAMPLES OF PRIMARY PROTECTIVE CLOTHING

**Primary Protective Clothing** is defined as clothing that is designed to be worn for work activities where significant exposure to molten substance splash, radiant heat and flame is likely to occur. Examples of primary protective clothing are firefighter turnout gear and aluminized suits. UltraSoft®, UltraSoft AC® and Indura® are not designed for use as primary protective clothing.

### EXAMPLES OF SECONDARY PROTECTIVE CLOTHING

**Secondary Protective Clothing** is designed for continuous wear in designated locations where intermittent exposure to molten substance splash, radiant heat and flame is possible (as defined by ASTM Standard F1002). UltraSoft®, UltraSoft AC® and Indura® flame resistant fabrics are designed for and ideal for use as secondary protective clothing.

## THE NEED FOR FLAME RESISTANT CLOTHING

Every day, workers in the electrical maintenance, utility, oil, gas, petrochemical and steel industries work in environments that may expose them to hazards that could cause severe or fatal burn injuries. In the event of a momentary electric arc, flash fire or molten metal splash exposure, everyday non-flame resistant work clothes can ignite and will continue to burn even after the source of ignition has been removed. Untreated natural fabrics will continue to burn until the fabric is totally consumed and non-flame resistant synthetic fabrics will burn with melting and dripping, causing severe contact burns to the skin. Government reports note that the majority of severe and fatal burn injuries are due to the individual's clothing igniting and continuing to burn, not by the exposure itself. The use of flame resistant clothing will provide thermal protection at the exposure area. The level of protection typically rests in the fabric weight and composition. After the source of the ignition is removed, flame resistant garments will self-extinguish, limiting the body burn percentage.

## SPECIFY FLAME RESISTANT FABRICS BY BRAND NAME

It is important to recognize that industry consensus standards only provide minimum performance criteria for flame resistant fabrics. While these standards typically provide a fair basis for comparing protective properties, they do not adequately address other important performance characteristics that are critical to achieving long-term success in a flame resistant clothing program. Many unproven and/or generic flame resistant fabrics promote the fact that they "meet the standards." However, they often experience quality problems including, but not limited to, inconsistent FR durability to laundering, poor shrinkage control, stiff feel, excessive color fading and UV degradation. And why go with a company that just meets standards, instead of a business that goes beyond? Investigating a fabric's performance in the real world and evaluating the experience and expertise of the company producing the product has become a necessary step in a global marketplace. Like many products in the safety category, the majority of companies specify flame resistant fabrics by brand name to ensure compliance and a long-term successful FR program. For the highest level of protection, comfort and value, insist on Westex — every time.

10 SECONDS AFTER A 3-SECOND FLASH FIRE EXPOSURE

**Non-Flame Resistant Clothing**
*Non-flame resistant clothing ignites and continues to burn*

**Westex UltraSoft®**
*Self-extinguishes, limiting the body burn percentage*

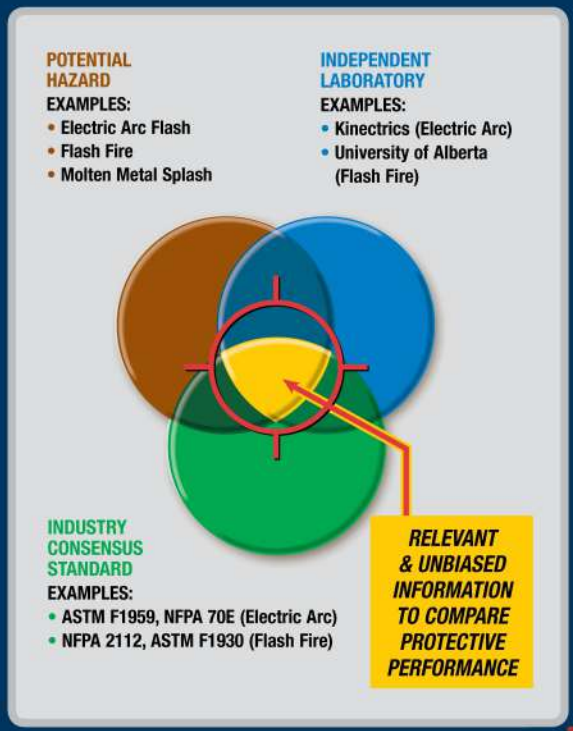
# KEYS TO EVALUATING AND COMPARING FLAME RESISTANT FABRICS

The first step when deciding on your best choice for FR fabric is to search out and evaluate information that was generated using the following three criteria. By doing this, you can evaluate different types of flame resistant fabrics on a level playing field and ensure that you're comparing "apples to apples."

1. Identify your potential hazard. Exposures such as electric arc flash and flash fire are unique hazards with vastly different characteristics and the test results do not directly correlate to one another. The results from flash fire testing should not be substituted for electric arc flash testing when evaluating products. Be wary of fiber and/or fabric producers that attempt to draw comparisons between these two hazards.

2. Identify industry consensus standards for the exposure. Industry standards have been developed for electric arc flash and flash fire testing. For electric arc flash, ASTM has developed F1959, which produces an arc rating. NFPA 2112 was created for employees that work in environments where a potential flash fire hazard exists.

3. Make sure the testing is conducted at independent laboratories. This will help ensure that unbiased and scientifically valid data is being produced. While it is often helpful and interesting to witness testing conducted by a company that has a vested interest in the FR business, there is no substitute for information generated at an independent laboratory.



## "ARC FLASH" DEFINED — NFPA 70E Annex K.3

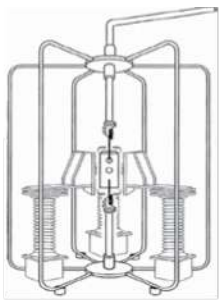
When an electric current passes through air between ungrounded conductors and grounded conductors, the temperatures can reach 35,000°F. Exposure to these extreme temperatures both burns the skin directly and causes ignition of clothing, which adds to the burn injury. The majority of hospital admissions due to electrical accidents are from the arc-flash burns, not from shock. Each year, more than 2,000 people are admitted to burn centers with severe arc-flash burns. Arc flash can and will kill at distances of 10 ft.

# ELECTRIC ARC FLASH PROTECTION

**Arc Flash Exposures**
An electric arc flash is a dangerous release of energy created by an electrical fault that contains thermal energy, pressure waves, acoustical energy and debris. The intense energy and very short duration of an electric arc flash represents a very unique exposure. The NFPA 70E standard says that the temperature of an electric arc flash can reach 35,000°F.

The thermal energy released in an electric arc flash is expressed in calories per centimeter squared (cal/cm$^2$). A typical electric arc flash can release energy levels from 4 cal/cm$^2$ to 30 cal/cm$^2$ and exposures between 30 cal/cm$^2$ and 60 cal/cm$^2$ are not uncommon. **Everyday work clothes made from regular cotton or poly/cotton fabrics can be readily ignited at exposure levels as low as 4-5 cal/cm$^2$ and once ignited, will continue to burn adding to the extent of injury sustained from the arc alone.** Many people consider non-flame resistant 100% cotton as an acceptable option for protection from an electric arc flash because there is not a synthetic component that can melt, drip and adhere to the skin. However, non-flame resistant 100% cotton can ignite just as easily as poly/cotton fabric in an electric arc flash. While 100% cotton will not melt and drip, it burns hotter than poly/cotton fabrics and typically is heavier, allowing it to burn longer and making it harder to extinguish. Go to westex.com to see videos of both 100% cotton and poly/cotton in live arc flash testing.

**ASTM F1506** (Standard Performance Specification for Textile Materials for Wearing Apparel for Use by Electrical Workers Exposed to Momentary Arc and Related Thermal Hazards) was developed to give minimum performance specifications for protective clothing. The major requirement of this specification was that the fabric used in garments is flame resistant and has been tested to ASTM F1959 to receive an arc rating. **ASTM F1959** (Standard Test Method for Determining the Arc Rating of Materials for Clothing) exposes panels of flame resistant fabrics to electric arc flashes of varying energies. Both the heat transmission through the fabric and the energy released by the electric arc are measured. The data is evaluated against the Stoll curve (or second degree burn curve) through logistic regression techniques to determine the probability of burn injury. The arc rating of the fabric or fabric system is then determined.



*ASTM F1959 standard test method for determining the arc rating of materials for clothing*

*Actual test performed according to ASTM F1959 test method*

*NFPA 70E General Industry*

# ELECTRIC ARC FLASH PROTECTION

## NFPA 70E

The National Fire Protection Association (NFPA) published the latest edition of the NFPA 70E Standard (Standard for Electrical Safety Requirements for Employee Workplaces) in 2012. NFPA 70E states, "employees shall wear arc rated clothing wherever there is a possible exposure to an electric arc flash." This requires employees working on or near energized parts and equipment to wear arc rated clothing that meets the requirements of ASTM F1506 and is appropriate to the potential energy of the hazard. Employers are required to perform a flash hazard analysis to determine the potential energy of the hazard and the flash protection boundary. A flash hazard analysis can be performed by calculating the potential incident energy of a piece of equipment or using Hazard Risk Category Classifications. Protective clothing must meet the calculated incident energy or the corresponding Hazard Risk Category that has an arc rating of at least the value listed in the "Protective Clothing Characteristics" section of the standard.

The vast majority of major companies in the U.S. have some employees that work on or near energized parts and equipment. OSHA considers the NFPA 70E standard a "recognized industry practice."

*NFPA 70E states, "employees shall wear Arc Rated Clothing wherever there is a possible exposure to an electric arc flash."*

## SIMPLIFY COMPLIANCE TO NFPA 70E

Many companies have decided to simplify compliance to NFPA 70E by implementing everyday uniform programs using Westex garments that meet the requirements of NFPA 70E Hazard Risk Categories (HRC) 0, 1 and 2 as a single layer (see chart on page 19). This can alleviate employer concerns about leaving the difficult decision of determining whether a specific routine electrical task is HRC 0, 1 or 2 in the hands of the employee. Please refer to NFPA 70E Annex H Simplified Two-Category, Arc-Rated Clothing System. To supplement everyday uniforms, arc flash suits and hoods in double-layer UltraSoft®, UltraSoft AC® and Indura® combinations are available for higher energy HRC 3 and 4 level tasks.

## LIVE ARC FLASH TESTING

Westex conducted a series of tests to create "real-life" arc flashes using common 480-volt equipment to help companies better understand the magnitude of the arc flash hazards that exist in nearly every facility in the world and highlight the importance of complying with the NFPA 70E standard. Our testing videos clearly demonstrate that, if you work on or near energized parts and equipment, wearing market-proven arc rated clothing and other PPE can and does dramatically reduce injury and save lives. Please go to westex.com to view the videos in their entirety.

## ELECTRIC UTILITIES

*OSHA*

OSHA (Occupational Safety & Health Administration) in the United States has confirmed that garments that meet the requirements of ASTM F1506 are in compliance with OSHA 29 CFR 1910.269 Electrical Power Generation, Transmission and Distribution, with regard to garments not contributing to burn severity. ASTM F1506 is a minimum industry standard.

By utilizing flame resistant garments, utilities can comply with OSHA requirements and avoid potentially more serious burn injuries from garment ignition.

| Standard for NFPA 70E Safety Requirements for Employee Workplaces — 2012 Edition. | | | |
|---|---|---|---|
| **HAZARD RISK CATEGORY** | **CLOTHING DESCRIPTION** | **MINIMUM ARC RATING (cal/cm²)** | **SINGLE LAYER FABRIC OPTIONS** |
| 0 | Non-melting flammable materials | N/A | **UltraSoft® Style 301 Shirt/Coverall & Style 451 Pant/Coverall Meet HRCs 0, 1, & 2.**<br><br>**UltraSoft AC® Style 901 Shirt/Coverall & Style 951 Pant/Coverall Meet HRCs 0, 1, & 2.** |
| 1 | Arc rated FR Shirt and FR Pants or FR Coverall | 4 | |
| 2 | Arc rated FR Shirt and FR Pants or FR Coverall | 8 | |
| 3 | Arc rated FR Shirt and FR Pants or FR Coverall, and arc flash suit selected so that the system arc rating meets the required minimum | 25 | |
| 4 | Arc rated FR Shirt and FR Pants or FR Coverall, and arc flash suit selected so that the system arc rating meets the required minimum | 40 | |

Extracted from 130.7(c)(16)

### *NESC*

The NESC (National Electrical Safety Code) covers workers during the installation, operation or maintenance of electric supply and communication lines and associated equipment. The 2007 version introduced rules that cover the use of arc rated clothing.

Effective on January 1, 2009, employers must perform a hazard risk analysis for employees that work on or near energized parts or equipment. If the assessment determines that energies available are over 2 cal/cm², then protective clothing (or clothing systems) shall be worn that has an arc rating equal to or greater than the anticipated level of energy.

*Con Edison "Real-World" Testing*

*Con Edison of New York has specified UltraSoft® by brand as the fabric of choice for their electrical workers.*

# The Con Edison Story

Con Edison of New York recently spent multiple years and several million dollars doing testing to examine the protective performance of a wide variety of safety equipment, including protective clothing. Con Edison's testing was revolutionary in that they performed it outside of laboratory conditions and were able to simulate real-world underground vault and overhead scenarios. Con Edison opened the doors to the testing facility and information generated for other electric utility companies, energy companies and electrical contractors to learn and help become educated on the dangers of an electric arc flash and how to better protect their employees.

This unprecedented test series was a major advancement forward in understanding the severe nature of an electric arc flash. The testing also uncovered additional elements not seen in laboratory testing including underground confined and overhead exposures, and molten metal exposure from equipment.

*NFPA 70E*
*HRC 2 compliant*

# ELECTRIC ARC FLASH PROTECTION

## SINGLE-LAYER ARC RATING FABRIC DATA

| UltraSoft® 88% Cotton, 12% High Tenacity Nylon Woven Fabrics | | | | |
|---|---|---|---|---|
| STYLE | WEIGHT | WEAVE | ATPV (cal/cm²) | NFPA 70E HAZARD RISK CATEGORY (HRC) |
| 301 Shirt/Lt. Wt. Coverall Twill | 7 oz (237 g/m²) | Twill | 8.7 | 2 |
| 451 Pant/Coverall Twill | 9 oz (305 g/m²) | Twill | 12.4 | 2 |
| 331 Chambray Denim Shirting | 5.5 oz (186 g/m²) | Twill | 6.0 | 1 |
| 341 Lightweight Shirting Twill | 5.5 oz (186 g/m²) | Twill | 6.1 | 1 |
| 881 Basketweave | 8 oz (271 g/m²) | Basketweave | 9.8 | 2 |
| 391 Denim | 13 oz (440 g/m²) | Denim Twill | 19.5 | 2 |
| 801 Heavyweight Sateen | 13 oz (440 g/m²) | Sateen | 21.0 | 2 |
| 961 Duck | 11 oz (372 g/m²) | Duck | 12.7 | 2 |

| UltraSoft AC® 88% Pima Cotton, 12% High Tenacity Nylon | | | | |
|---|---|---|---|---|
| STYLE | WEIGHT | WEAVE | ATPV (cal/cm²) | NFPA 70E HAZARD RISK CATEGORY (HRC) |
| 901 Shirt/ Lt. Wt. Coverall Twill | 7 oz (237 g/m²) | Twill | 8.3 | 2 |
| 951 Pant/Coverall Twill | 9 oz (305 g/m²) | Twill | 11.7 | 2 |

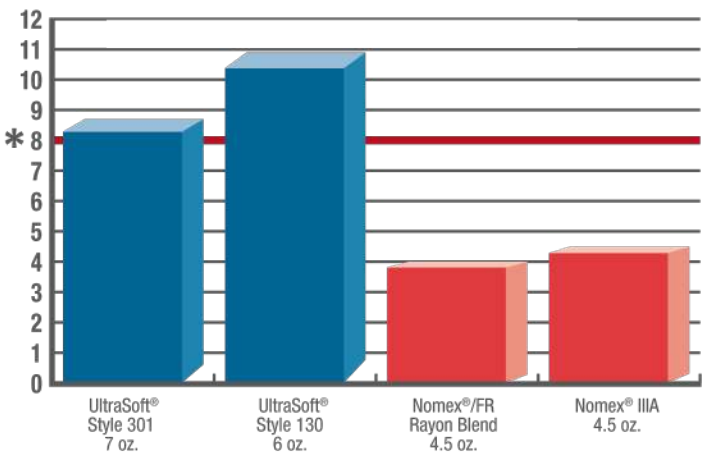
| UltraSoft® 88% Cotton, 12% High Tenacity Nylon Knit & Fleece Fabrics | | | | |
|---|---|---|---|---|
| STYLE | WEIGHT | WEAVE | ATPV (cal/cm²) | NFPA 70E HAZARD RISK CATEGORY (HRC) |
| 130 Interlock Knit | 6 oz (203 g/m²) | Interlock Knit | 10.9 | 2 |
| 131* Rib Knit | 6.5 oz (220 g/m²) | Rib Knit | 12.1 | 2 |
| 180 Fleece | 11 oz (372 g/m²) | Fleece | 17.9 (Ebt) | 2 |
| 181* Rib Knit | 10.5 oz (355 g/m²) | Rib Knit | 24.7 | 2 |

* Content = 86% cotton, 12% high tenacity nylon, 2% spandex

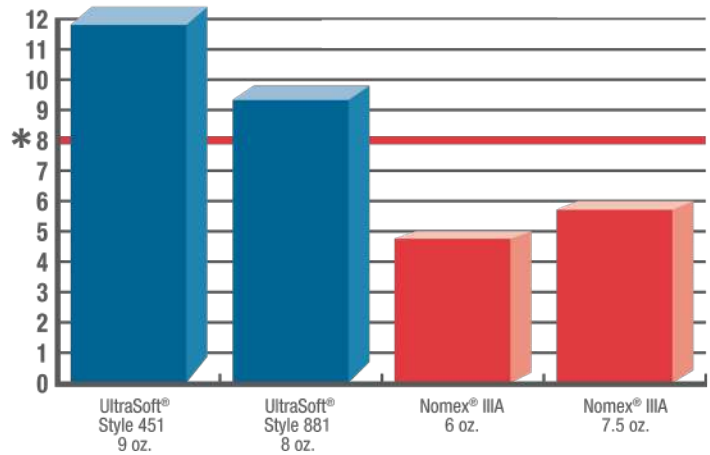
| Indura® 100% Cotton Wovens | | | | |
|---|---|---|---|---|
| STYLE | WEIGHT | WEAVE | ATPV (cal/cm²) | NFPA 70E HAZARD RISK CATEGORY (HRC) |
| 30 Shirting Twill | 7 oz (237 g/m²) | Twill | 7.7 | 1 |
| 45 Twill | 9 oz (305 g/m²) | Twill | 10.8 | 2 |
| 85 Sateen | 9 oz (305 g/m²) | Sateen | 11.5 | 2 |
| 306 Denim | 12 oz (406 g/m²) | Denim Twill | 14.4 | 2 |
| 308 Denim | 14 oz (474 g/m²) | Denim Twill | 18.3 | 2 |
| 315 USS Whipcord | 12 oz (406 g/m²) | Whipcord | 12.9 | 2 |

All results based on independent tests conducted at Kinectrics per ASTM F1959

### ATPV Shirt/Lightweight Coverall Fabrics




### ATPV Pant/Coverall Fabrics




*HRC 2

# MULTI-LAYER ARC RATING FABRIC DATA

In addition to testing single-layer fabrics for arc ratings, Westex has tested over 100 combinations of UltraSoft®, UltraSoft AC® and Indura® fabrics that could be used in layers. Layering could be used for cold weather comfort with multiple shirts, sweatshirts or insulated outerwear. Layering can also be effective in protecting to higher incident energies, such as NFPA 70E Hazard Risk Categories 3 and 4, that cannot be protected against with single-layer garments.

| UltraSoft® Multi-Layer Shirt Combinations | | |
|---|---|---|
| **OUTER LAYER** | **UNDER LAYER** | **ATPV** |
| S/301 7 oz Shirt Twill | S/130 6.25 oz Knit | 29 |
| S/341 5.5 oz LightWeight Shirt | S/130 6.25 oz Knit | 24.8 |
| S/130 6.25 oz Knit | S/130 6.25 oz Knit | 24 |
| 180 11 oz Fleece | 301 7 oz Shirt Twill | 37.9 |
| 180 11 oz Fleece | 341 5.5 oz Lightweight Shirt | 35 |
| 180 11 oz Fleece | 130 6 oz Knit | 37.8 |

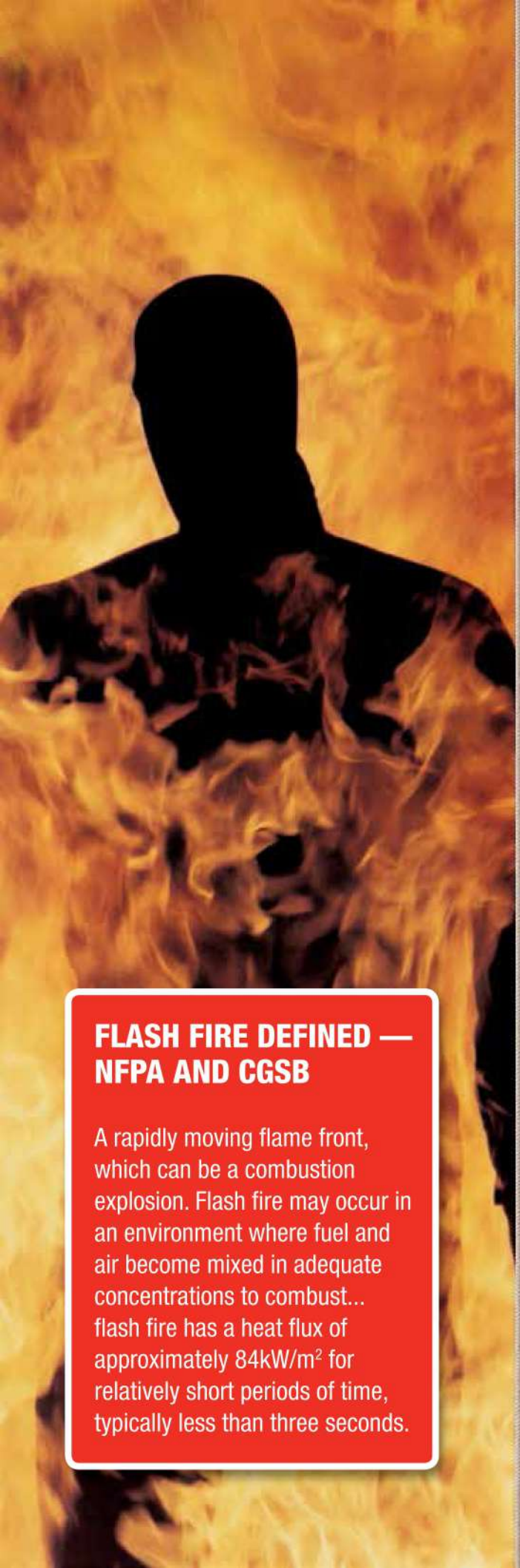
| UltraSoft® Outerwear Combinations | | |
|---|---|---|
| **SHELL** | **LINER** | **ATPV** |
| S/301 7 oz Shirt Twill | 3M Thinsulate FR 120 gram | 37.2 |
| | 3M Thinsulate FR 150 gram | 37.6 |
| | 3M Thinsulate FR 200 gram | 44.1 |
| | 10 oz INDURA Moda-Quilt | 30.8 |
| | 12 oz INDURA Moda-Quilt | 35.3 |
| S/451 9 oz Twill | 3M Thinsulate FR 120 gram | 41.0 |
| | 3M Thinsulate FR 150 gram | 44.6 |
| | 3M Thinsulate FR 200 gram | 48.0 |
| | 10 oz INDURA Moda-Quilt | 35.9 |
| | 12 oz INDURA Moda-Quilt | 40.8 |
| 961 11 oz Duck | 3M Thinsulate FR 120 gram | 46.5 |
| | 3M Thinsulate FR 150 gram | 47.5 |
| | 3M Thinsulate FR 200 gram | 50.7 |
| | 10 oz INDURA Moda-Quilt | 37.2 |
| | 12 oz INDURA Moda-Quilt | 46.4 |


| Coverall Layering Combinations | | |
|---|---|---|
| **OUTER LAYER** | **UNDER LAYER** | **ATPV** |
| S/301 7 oz Shirt Twill | S/301 7 oz Shirt Twill Shirt | 26.8 |
| | S/341 5.5 oz LightWeight Shirt | 24.8 |
| | S/451 9 oz Twill Pant | 31.3 |
| S/451 9 oz Twill | S/301 7 oz Shirt Twill Shirt | 32.2 |
| | S/901 7 oz UltraSoft AC | 33.9 |
| | S/341 5.5 oz LightWeight Shirt | 32.4 |
| | S/130 6.25 oz Knit | 34.3 |
| | S/451 9 oz Twill Pant | 39.2 |
| | S/308 14 oz Indura Denim | 38.9 |

*NFPA 70E*
*HRC 4 compliant*

| Arc Flash Suits | | |
|---|---|---|
| **OUTER LAYER** | **UNDER LAYER** | **ATPV** |
| S/451 9 oz Twill Pant | S/801 13 oz Sateen | 43 |
| S/851 9 oz Sateen | S/851 9 oz Sateen | 45 |

| Balaclava Two-Layer Combinations | | |
|---|---|---|
| **OUTER LAYER** | **UNDER LAYER** | **ATPV** |
| S/131 6.5 oz Rib Knit | S/131 6.5 oz Rib Knit | 28.2 |
| S/181 10.5 oz Rib Knit | S/181 10.5 oz Rib Knit | 47.8 |



## FLASH FIRE DEFINED — NFPA AND CGSB

A rapidly moving flame front, which can be a combustion explosion. Flash fire may occur in an environment where fuel and air become mixed in adequate concentrations to combust... flash fire has a heat flux of approximately 84kW/m$^2$ for relatively short periods of time, typically less than three seconds.

# FLASH FIRE PROTECTION

### PROTECTION FROM FLASH FIRE EXPOSURES

In the oil, gas, chemical and petrochemical industries, the threat of flash fire exposures has made the use of flame resistant clothing necessary. Flame resistant clothing minimizes burn injury and provides workers a few seconds of escape time. Non-flame resistant clothing can ignite instantly in a flash fire — with exposure providing an additional fuel source — dramatically increasing the burn injury percentage and severity. UltraSoft®, UltraSoft AC®, Indura® and Nomex® will all provide far more protection than non-flame resistant garments.

To compare the protective capabilities of Westex fabrics in relation to Nomex® IIIA, thermal instrumented manikin tests were conducted at the University of Alberta, home to one of the very few independent flash fire manikin laboratories in the world. In service since 1989, lab workers have conducted thousands of tests for hundreds of clients. During testing, a manikin is exposed to a flash fire created by propane burners, and the resultant heat rise is measured by 110 thermocouples. Heat fluxes are precisely controlled to applicable standards, and a computer collects the data and, by comparison to the Stoll curve, is able to predict the extent, severity and location of second- and third-degree body burn.

This testing reported here is, to the best of our knowledge, the largest and most comprehensive independent series ever conducted and published. All aspects of the protocol were strictly controlled to ensure maximum reliability and repeatability of results. All coveralls were commercially available, produced by a major manufacturer and sourced off-the-shelf in the same size and style. All were identically laundered and conditioned to full applicable standards prior to testing. All testing was conducted to the ASTM F1930 Standard Test Method, and all data points reflect the average of at least three replicates or more. The computer-generated body burn results highlighted on the next page are individual determinations of NFPA 2112 testing and are representative of the average. This three-second exposure data, along with a complete burn curve, are included later in the brochure.

The comparative weights offered in the marketplace for shirts and pants constructed with Westex fabrics are 7 oz/yd$^2$ (237 g/m$^2$) and 9 oz/yd$^2$ (305 g/m$^2$), compared to 4.5 oz/yd$^2$ (153 g/m$^2$) and 6 oz/yd$^2$ (203 g/m$^2$) Nomex® IIIA fabric, respectively. Therefore, **the manikin tests were conducted segregating categories of "Shirting" and "Pant/Coverall" weights to accurately represent the garments that are commercially available.**

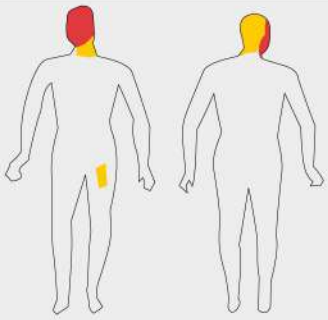
## COMPARING FLASH FIRE PERFORMANCE

### What is Relevant for Secondary Protective Clothing?

- NFPA 2112 test exposure is set at three seconds.
- Secondary protective clothing is designed to provide the worker "a few seconds escape time."
- CGSB and NFPA define a flash fire as "typically three seconds or less."
- NFPA 2112 sets failure above 50% total body burn.

## PANT/COVERALL WEIGHT COMPARISON

**UltraSoft®**

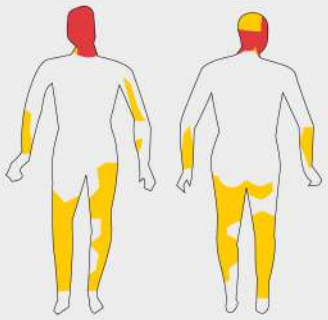



THE UNIVERSITY OF ALBERTA
Protective Clothing and
Equipment Research Facility

**Fire Protective Clothing Evaluation System**
**5-15-2007 451 UltraSoft® 9 oz**

| Test Type | Flash Fire Simulation |
|---|---|
| Exposure Time | 3.06 sec. |
| Measurement Time | 60.0 sec. |
| • Second-Degree Burn | 5.15% |
| • Third-Degree Burn | 4.00% |
| TOTAL BURN | 9.15% |
| BURN NUMBER | 00964 |

**Nomex® IIIA**




THE UNIVERSITY OF ALBERTA
Protective Clothing and
Equipment Research Facility

**Fire Protective Clothing Evaluation System**
**4-24-2007 Nomex® IIIA 6 oz**

| Test Type | Flash Fire Simulation |
|---|---|
| Exposure Time | 3.06 sec. |
| Measurement Time | 60.0 sec. |
| • Second-Degree Burn | 28.65% |
| • Third-Degree Burn | 6.80% |
| TOTAL BURN | 35.45% |
| BURN NUMBER | 00505 |

*Note: 88% is the maximum possible since the hands and feet are excluded. All figures include 7% for the head.*

*UltraSoft®* *Nomex® IIIA*

*Before 3-second flash fire exposure*

*UltraSoft®* *Nomex® IIIA*

*After 3-second flash fire exposure*

*UltraSoft®* *Nomex® IIIA*

*Close-up views after 3-second flash fire exposure*

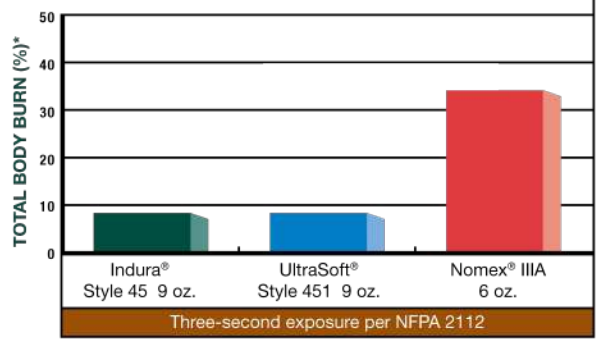
# FLASH FIRE PROTECTION

## PROTECTION FROM FLASH FIRE EXPOSURE: CHART DATA

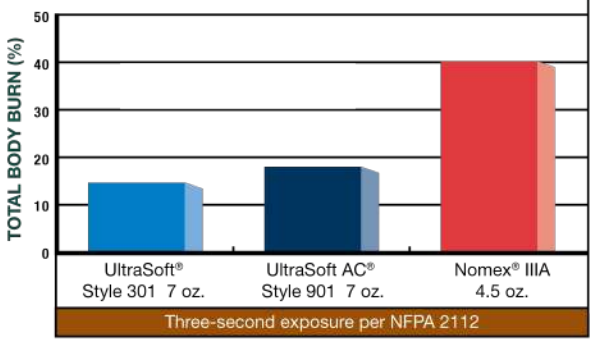
### LABORATORY TESTING PROTOCOL

- Independent university laboratory testing
- Adherence to ASTM F1930 standard test method
- Identically sized and styled 42 regular coveralls
- All coveralls tested over 100% cotton T-shirts and briefs

**PANT/COVERALL WEIGHT FABRICS**

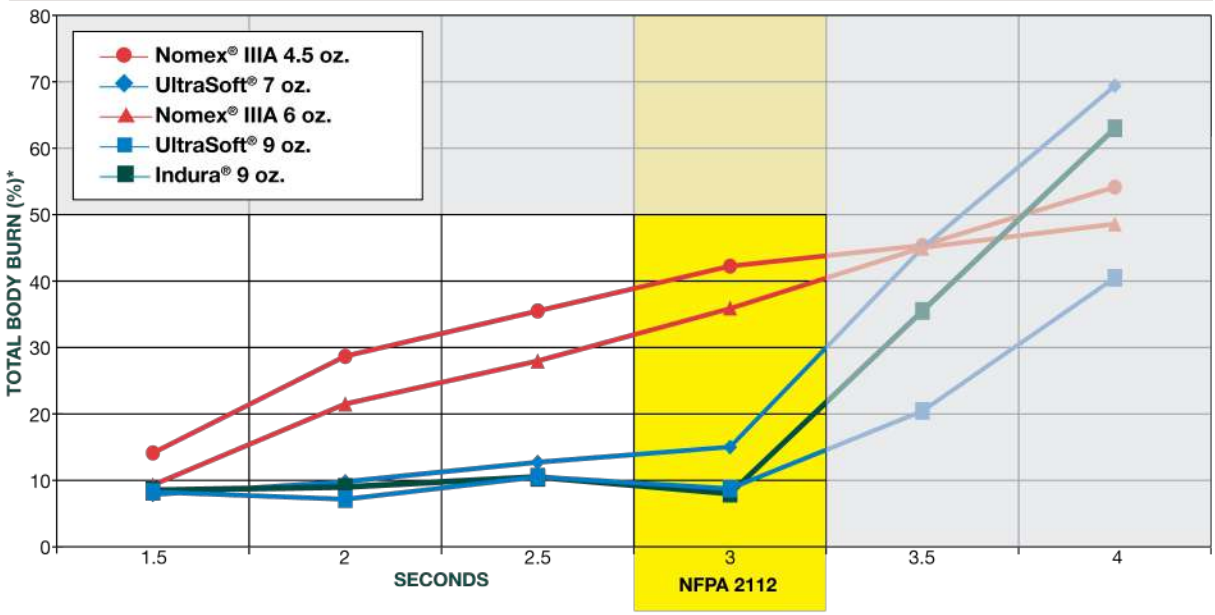



**SHIRT/LIGHTWEIGHT COVERALL WEIGHT FABRICS**




*Note: 88% is the maximum possible since the hands and feet are excluded. All figures include 7% for the head.

**ALL WEIGHT FABRICS**




*Note: 88% is the maximum possible since the hands and feet are excluded. All figures include 7% for the head.*

Although three seconds has been established as the time frame to analyze the performance of secondary clothing, additional exposure times in the range of 1.5 to 4.0 seconds were examined to more completely profile fabric protective performance. The charts are highlighted up to three seconds and below 50% body burn in accordance with NFPA and CGSB standards and definitions. Within these parameters, **Westex fabrics have a protective advantage over Nomex® IIIA throughout the entire range of the burn curve.** The issue of relevance in comparing secondary protective clothing fabrics above these levels should be carefully considered. If your exposure potential is four to five seconds or produces body burns near or over 50%, Westex highly recommends protective clothing systems of multiple flame resistant layers or primary protective clothing such as turnout gear.

# MOLTEN FERROUS METAL SPLASH PROTECTION

## PROTECTION FROM FERROUS METAL & WELDING EXPOSURES

For over 40 years, heavyweight flame resistant cotton fabrics have been utilized by the steel industry for secondary protective clothing for workers doing routine tasks in steel processing. Secondary protective clothing is defined as "protective clothing for continuous wear during work activities in designated locations in which intermittent exposure to molten substance splash, radiant heat and flame sources are possible."

**The essence of protection in this category rests in two critical factors:**

1. **The fabric must be flame resistant so that it will not ignite and continue to burn when the heat source is removed.**

2. **In the specific instance of exposure to molten ferrous metal, the fabric must demonstrate the ability to shed molten metal from its surface without sticking.**

UltraSoft®, UltraSoft AC® and Indura® fabrics have the unique ability to shed molten ferrous metals. While some charring may occur, the flame resistant properties of Westex fabrics will preclude ignition and continued combustion. Non-flame resistant cotton may shed ferrous metals and welding. However, the potential for ignition and continued combustion is very high, thus increasing the injury potential.

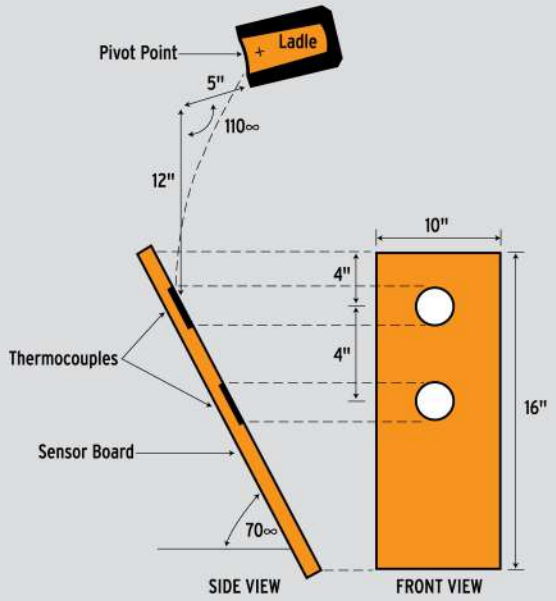
When evaluating fabrics for molten metal applications, it is imperative that fabrics be evaluated on site in the form of testing and wear trials. Because different work sites handle different alloys, a trial with the specific metal must be made. Additionally, it should be recognized that worker protection from second-degree burn in ferrous metal processing is highly dependent on the quantity of metal exposed to and the number of layers and weight of fabric worn; therefore different fabric weights should be evaluated. A minimum weight of 9 oz/yd$^2$ (305 g/m$^2$) fabrics is typically recommended for light welding/cutting operations and 12 oz/yd$^2$ (406 g/m$^2$) or heavier fabrics for most other foundry and molten metal applications. In general, heavier weights will provide better insulation from heat transfer, but the end user must determine the most appropriate weight for their application.

Nomex® fabrics are inappropriate for molten metal splash exposures since molten metals adhere to aramid fabrics.

*Please note that UltraSoft®, UltraSoft AC® and Indura® fabrics are not intended for use near molten aluminum.*

*Please contact Westex for information about Vinex® flame and aluminum splash resistant fabrics.*

### Schematic of Test Apparatus For ASTM F955




ASTM F955 covers the standard test method to determine fabric performance using the test apparatus illustrated above.

# KNOWING THE FR STANDARD
# COMPLIANCE FOR YOUR INDUSTRY

### NFPA 2112-2012 - CERTIFIED

This standard specifies the minimum performance requirements and test methods for FR fabrics and components, and the design and certification requirements for clothing developed to protect workers from flash fire hazards. It requires FR fabrics to pass a comprehensive series of thermal tests, including the following:

- **ASTM D6413** – Vertical Flammability test: Fabric must not have more than a maximum of two seconds afterflame and a 4-inch char length.
- **ASTM F2700** – Heat Transfer Performance (HTP) test: Fabric must have a minimum HTP of 6 cal/cm2 with a spacer and 3 cal/cm2 when in contact with the heat source.
- **Thermal Stability test**: Fabric must not melt or drip, separate or ignite after five minutes in an oven at 500 degrees Fahrenheit.
- **Thermal Shrinkage test**: Fabric must not shrink more than 10 percent after five minutes in an oven at 500 degrees Fahrenheit.
- **ASTM F1930-11** – Thermal Mannequin test: Fabric must not have more than a maximum of 50-percent predicted body burn after a three-second thermal exposure.

### NFPA 1975-2014 - CERTIFIED

A standard for emergency services on the designs, performance , testing and certification of non-primary protective station and work uniforms, includes performance requirements for both non-FR and FR fabrics and garments on heat and thermal shrinkage, thermal stability, seam strength and label durability. The optional FR station wear must meet the non-FR requirements as well as measure up to flammability testing of fabric and other small textile components.

### NFPA 1977-2011 - CERTIFIED

Protective clothing and equipment covered include garments, helmets, gloves, footwear, and goggles, chainsaw protectors, and load-carrying equipment. Provisions apply to certification, product labeling, instructions for the user, design criteria, performance requirements, and testing methods for everything from resistance to tearing, flame, conductive heat, puncture, and corrosion to tests for dexterity, grip, burst strength, and abrasion.

### NFPA 70E-2015 - CERTIFIED

This standard addresses electrical safety-related work practices for employee workplaces. These safety measures are necessary for the practical safeguarding of employees relative to the hazards associated with electrical energy during activities such as installation, inspection, operation, maintenance and demolition of electric conductors, electric equipment, signaling and communication conductors and equipment, and raceways. This standard also includes safe work practices for employees performing other work activities that can expose them to electrical hazards. It does not cover safety-related work practices for ships, railway rolling stock, aircraft, underground mines, or communications and utilities equipment.

The FR fabric and garment requirements are those shown in ASTM F1506. Tables of common types of electrical equipment are included and assigned one of four PPE Categories (1, 2, 3 or 4). Each category has a minimum arc rating for protective clothing measured in cal/cm$^2$, plus other personal protective equipment (PPE) requirements.

- **CAT 1** = 4 cal/cm$^2$
- **CAT 2** = 8 cal/cm$^2$
- **CAT 3** = 25 cal/cm$^2$
- **CAT 4** = 40 cal/cm$^2$

### ASTM F1506: ASTM F1506-10A - CERTIFIED

This specification provides performance requirements for clothing worn by electrical utility workers and other personnel working around energized parts. In addition to non-thermal requirements, the standard requires the fabric to be FR. Flame resistance here is measured using the ASTM D6413 Vertical Flame test (maximum of two seconds afterflame and 6-inch char length). The arc rating is either the arc thermal performance value (ATPV) or energy breakopen threshold (EBT) as measured by the ASTM F1959-06ae1 Arc Thermal Performance test.

### OSHA 1910.269 - CERTIFIED

This maintenance standard applies to electric utilities and industrial cogeneration plants when work is performed at existing facilities (e.g., maintenance work). This standard does not apply to the construction of new facilities.

# Certifications

- ☑ Westex fabric is made in the USA
- ☑ UL CERTIFIED NFPA 2112 TEST METHOD ASTM F1930
- ☑ UL CERTIFIED NFPA 70E PPE CAT.2 /ASTM F1506 INCOMPLIANCE WITH OSHA 29 CFR 1910.269
- ☑ UL CAN/CGSB 155.20 CERTIFIED
- ☑ Kinetrics ISO 9001-2000 CERTIFIED OF ASTM F1959/ F1959M-04 CERTIFIED
- ☑ Vartest Lab CERTIFIED OF ANSI/ISEA 107-2010 COMPLIANCE (SPECIAL YELLOW COLOR) METHOD ISO/IEC17025 COMPLIANCE, NFPA 70E PPE CAT. 2 COMPLIANCE.
- ☑ BTTG CERTIFIED OF EN ISO 11611:2007
- ☑ OEKO-TEX CERTIFIED PRODUCTS meet The human Ecological Requirements of the standard presently established for products with direct contact to skin.
- ☑ UL CERTIFIED NFPA 1975
- ☑ UL CERTIFIED NFPA 1977

# Industry Partnerships

# Market Proven

# WHY CHOOSE WESTEX?

- ☑ Is Guaranteed of the Flame Resistance for the Life Of The Garment.
- ☑ Guarantee is combined with Westex Propietary Fabric Softening Process and Double Shrunk Technology.
- ☑ A legacy of pioneering protection, established since 1919 during World War II for the United States military.
- ☑ Westex brand fabric are specified by the thousands of end user companies globally.
- ☑ Westex with Uncompromising on the Best Comfort, the Protection and the Value.
- ☑ Westex promote and help end users to develop successful FR program by providing:
  - Safety Through Education
  - Safety Through Innovation
  - Safety Through Engineering
- ☑ Westex fabric is market proven - market-proven means it's worn by tens of thousands of workers at hundreds of companies, in multiple industries over many years. And when it's time to be replaced, those companies purchase it again and again...THAT is market-proven.
- ☑ Milliken Acquires Westex, Springfield, the Power of 3 One Company. One Priority. You.
- ☑ Milliken has become one of the nation's Top Three Companies for the number of sites receiving the coveted Osha Certification.
- ☑ Milliken has twice been named one of the world's safest company by EHS today.

VPP

America's SAFEST COMPANIES

2015 WORLD'S MOST ETHICAL COMPANIES®
WWW.ETHISPHERE.COM

# Westex Delivers Peace of Mind

**WE ARE FR INNOVATORS WE ARE FR EDUCATORS WE ARE FR ENGINEERS**




As a leader in the FR fabric industry, we've made it our mission to deliver a true guarantee of flame resistance for the life of the garment.

This guarantee — combined with our proprietary fabric softening process and double-shrunk technology — has made Westex the choice of thousands of FR fabric specifiers worldwide.

And for more than two decades, our UltraSoft®, UltraSoft AC®, and Indura® brand fabrics have delivered on this guarantee under the harshest test conditions — and in the field.

Simply put: when it comes to safety, we will not compromise.

For ultimate peace of mind, choose Westex.

Westex UltraSoft® Westex UltraSoft AC® Westex Indura®

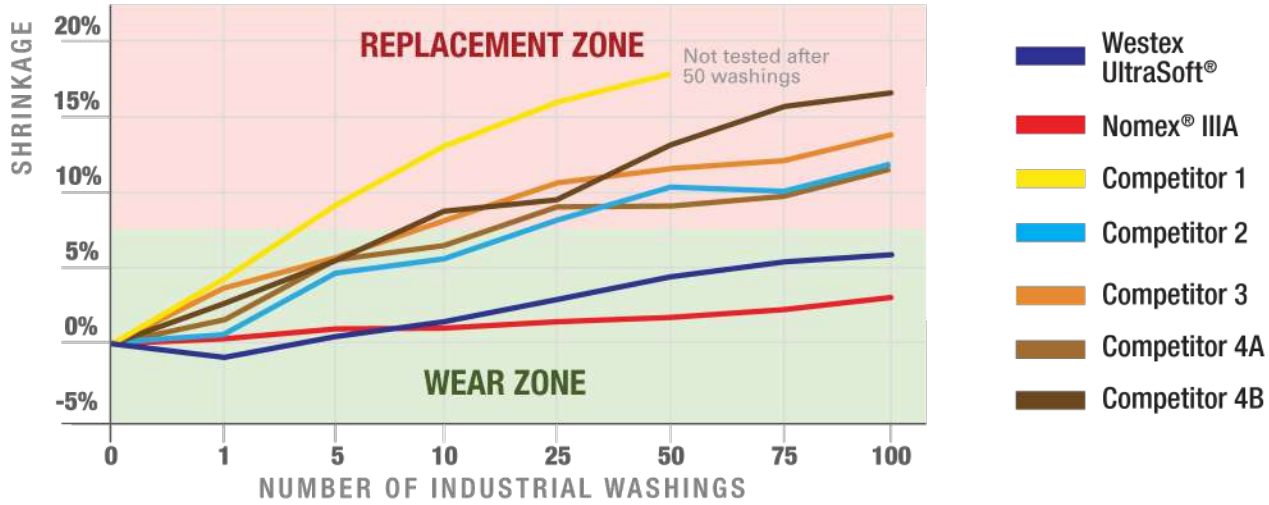
# DISCOVER THE WESTEX DIFFERENCE

## KEY FABRIC ATTRIBUTE COMPARISON

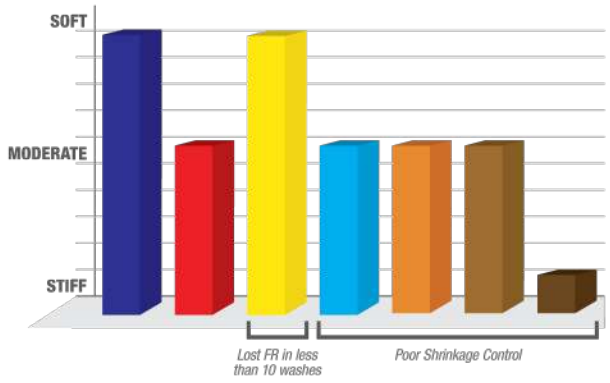
| | | FABRIC/GARMENT | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Westex UltraSoft® | Nomex® IIIA | Competitor 1 | Competitor 2 | Competitor 3 | Competitor 4A | Competitor 4B |
| TEST RESULTS | Origin of Fabric | USA | USA | Asia | USA | USA | USA | USA |
| | Flame Resistance | ✓ Passes 100 Washings | ✓ Passes 100 Washings | Fails at 5 Washings | Fails at 25 Washings | Fails at 5 Washings | Fails at 75 Washings | ✓ Passes 100 Washings |
| | Shrinkage | ✓ Less than 7% at 100 Washings | ✓ Less than 7% at 100 Washings | Over 18% at 50 Washings* | Over 11% at 100 Washings | Over 13% at 100 Washings | Over 10% at 100 Washings | Over 16% at 100 Washings |
| | Softness & Comfort | ✓ Soft Fabric Feel | Moderate Fabric Feel | ✓ Soft Fabric Feel | Moderate Fabric Feel | Moderate Fabric Feel | Moderate Fabric Feel | Stiff Fabric Feel |

* Testing was not needed on fabric after 50 launderings

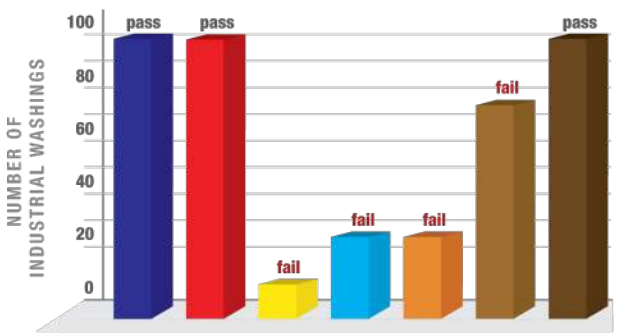
## SHRINKAGE COMPARISON




## SOFTNESS COMPARISON




## FLAME RESISTANCE AFTER LAUNDERING




* "Pass" indicates the fabrics self-extinguish, "Fail" indicates the fabrics burned the entire length. Please see Flame Resistance Defined. Laundered per WTX-87 wash method.

UltraSoft®

# WHEN SAFETY IS INVOLVED THE FABRIC BRAND MATTERS

Many companies have made large investments in flame resistant clothing to keep their employees safe. Since flame resistant fabric is a critical factor in determining the amount of protection the garment will provide, end users should take an active role in investigating and specifying the brand of fabric that is used to produce the finished garment. After all, the safety of your employees is too important to let just anyone make the fabric decision for you. Be sure to choose a company that is fully committed to raising the bar on protection and never making compromises. This will help ensure that a marginally lower up-front investment on a generic/off-brand product doesn't lead to employee injuries, program dissatisfaction or significant additional costs downstream.

## WHY WESTEX?

Generic and off-brand flame resistant fabrics often claim they are "as good as" Westex fabrics — but our consistent performance proves there is no substitute for the original. We never stop pushing ourselves to create the safest, most comfortable fabrics possible — which is why we continue to be a world leader in FR and the largest manufacturer of flame resistant cotton and cotton blend fabrics.

## EXTENSIVE EXPERIENCE

- Established in 1919, Westex has been setting the standard for high quality flame resistant fabrics for decades.

## CONSISTENT QUALITY

- Years of research and development, coupled with custom-engineered equipment and proprietary technology, give Westex fabrics superior performance characteristics.

## INDUSTRY LEADERSHIP

- Our commitment to the flame resistant clothing market has allowed us to lead the industry with innovative new fabric styles and comprehensive technical support.

## MARKET-PROVEN PERFORMANCE

- With decades of outstanding proven performance and millions of garments in service worldwide, Westex fabrics are truly proven products.

## PRODUCTION CAPACITY AND INVENTORY SUPPORT

- With over 750,000 square feet of "bricks and mortar" and three ranges, Westex can provide unparalleled worldwide support to the protective clothing market.


**866.493.7839 WESTEX.COM**

The information in this brochure is based on testing conducted by or conducted on behalf of Westex and represents our analysis of the test results. It is not intended to substitute for any testing that may be unique and necessary for your facility for you to determine the suitability of our products for your particular purpose. Since we cannot anticipate all variations in end-user conditions, Westex makes no warranties and assumes no liability whatsoever in connection with any use of this information. All test results reported are based on standard laboratory tests related to exposure to arcs, flames and heat. Manikin tests yield laboratory predictions of relative burn injury based on factors such as fabric type, fabric weight, garment styling and fit, laundering, exposure energy and exposure time. The results reported should not be used to predict garment performance in actual fire situations. For maximum maintenance of the protective properties of garments made from flame resistant fabrics, garments should be properly cleaned for the thorough removal of greases, oily soil and other contaminants that may affect flame resistance of the fabric. Consult with the fabric supplier, garment manufacturer and launderer for recommendations of proper cleaning techniques.

Indura®, UltraSoft®, UltraSoft AC®, Moda-Quilt® and Vinex® are registered trademarks of Westex. Nomex® IIIA is a registered trademark of the DuPont Company. Thinsulate™ is a trademark of 3M Company.

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WESTEX®

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## INDONESIA:

**PT. SAHABAT UTAMA SUKSESINDO**

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# THE SAFETY IS IN THE FABRIC

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# PT. SAHABAT UTAMA SUKSESINDO

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Moving forward everyday

## ABOUT US

PT. Sahabat Utama Suksesindo is an importer and sole distributor for safety protection product in Indonesia.

Established on March 4, 2010, the company has been growing rapidly in the safety business with the support and alliances from overseas ISO class manufacturing company as a business partner.

Today, the company had been in the sixth years of its operation, thanks to the solid, professional team involved that had been working together hand in hand, dedicating the work results to our valued customers across Indonesia.

## OUR VISION

To be a trusted, worthy company that work hand in hand together between customers and the overseas alliances partner for the Fire Hazards Safety Awareness and giving safety solutions to the society.

## OUR MISSION

To provide products that are good, green technology, safe, affordable, and durable as a safety protection solution toward the lives in the region of Indonesia.

## CONTACT

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Jl. R. E. Martadinata
Jakarta Utara - Indonesia

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E-mail: sahabatutama@rocketmail.com
Website: www.sahabatsuksesindo.com

# OUR DOINGS

We have consistently introduced safety awareness and the importance of quality in every safety products, and controlling the quality of products that had been delivered to the market.

Our products have been marketed in various companies such as factories, busways, apartments, private homes, offices and in Business Centers.

Having after sales guarantee, known for its quality, availability, reliability in price, and service, it has been well accepted in the domestic market across Indonesia by customers' labels or in our own label.

# OUR PRODUCTS


❖ Chemicals

- ABC Powder
- BC Powder

❖ Equipments

- Fire extinguisher Cylinder: 1 kg - 12 kg
- Carbon Dioxcides ($CO_2$ ) Cylinder: 2 kg - 25 kg
- Trolley for Fire Extinguisher: 25 kg - 50 kg
- Hose reel
- Rubber Unidur Fire Hose: Protect and OSW - 1,5" , 2" ,2.5" , 3" ,4"
- Canvas Fire Hose: Syntact OSW - 1.5", 2" , 2.5"
- Spare parts: Manometer, Valve ,Nozzle etc
- Smoke detector
- Fire Blanket
- Fire alarm Box

# DOMESTIC MARKET

## SUMATRA
- MEDAN
- PADANG
- PEKANBARU
- BENGKULU
- PALEMBANG

## JAWA
- JAKARTA
- BANDUNG
- SEMARANG
- YOGYAKARTA
- SURABAYA
- MALANG

## KALIMANTAN
- PONTIANAK
- BANJARMASIN
- BALIKPAPAN
- SAMARINDA

## SULAWESI
- MAKASSAR
- PALU
- GORONTALO
- MANADO

## BALI
- DENPASAR

## LOMBOK
- MATARAM

## NTT
- KUPANG

## PAPUA
- JAYAPURA

"To give safety protection not only from the equipments, but also protection from head-to-toe, as a complete protection to save lives."

# PRODUCTS

THE NEXT LEVEL

# CERTIFICATION LETTERS

- Akte Pendirian
- Surat Terdaftar Departemen Keuangan dan Pajak
- Surat pengukuhan Pengusaha Kena Pajak
- No.NPWP
- Surat Izin Usaha ( Siup )
- Tanda Daftar Perusahaan ( TDP )
- Surat Keterangan Domisili
- Surat Pengesahan Kementerian Hukum dan HAM
- Surat API-U
- Surat NIK
- Surat Lulus Uji Dinas Pemadam untuk produk Dry Chemical dan Alat Apar
- Surat Penunjukan Sole Agent Produk Apar dan Dry Chemical Powder
- Surat Penunjukan Sole Partner Westex by Milliken

# WESTEX BY MILLIKEN

# PRODUCT DETAILS

COVERALL
JACKET
WORK SHIRT AND PANT

WESTEX by Milliken

WESTEX UltraSoft

DISCOVER THE WESTEX DIFFERENCE

## Authorized Partner in Indonesia :


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Rukan Permata Ancol Block E No. 33
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Tel .: 0062 21 645 1158
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email address : sahabatutama@rocketmail.com
website : http://sahabatsuksesindo.com/


Style 0301 UltraSoft 7 oz Twill
MPG S000100301
Fiber Content : 88% Cotton / 12% High Tenacity Nylon ( COVERALL )

PALET WARNA

## When It Comes To FR Safety


## Specification Fire Resistant Fabric : Westex by Milliken

| 3 x 1 LH Twill | Process Average | Specs | Test Method |
|---|---|---|---|
| Weight | 7.8 oz/yd | 7.7 oz/yd2 (+/- 5%) | ASTM D3776 |
| Width ( Overall / Cuttable ) | 63.5" / 62.5" | > 62.5" Cuttable | ASTM D3774 |
| Tear Strength ( lbs W x F ) | 9.2 X 10.0 | > 7.0 x > 7.0 | ASTM D1424 (ISO 13937) |
| Tensile Strength ( lbs W x F ) | 100 x 72 | > 90 x > 60 | ASTM D5034 |
| Laundry Shrinkage ( W x F ) after 5 wash | 1.4% X 1.4% | < 3.0% x < 3.0% | ASTM 1506 AATCC 135-3,IV,Aiii |
| Laundry Shrinkage IL ( W x F ) after 10 wash | 1.5% x 0.9% | < 3.5% x < 3.5% | NFPA 2112 Wash method |
| Vertical Flame , in. ( W x F ) | 3.4" x 3.4" | < 3.5% x < 3.5% | ASTM D6413 |
| Vertical Flame , in. ( W x F ) after 100 Industrial Laundry (IL) | 2.9" x 2.9" | ≤ 4.0" x ≤ 4.0" | ASTM D6413 NFPA 2112 (wash) |
| Arc Rating ATPV , ( cal/cm2 ) | 8.7 | ≥ 8.0 | ASTM F1959 |
| Thermal Manikin , original UL test , Dec 13,2011 | 16.1% | < 50% | ASTM 1930 |

## Accessories Specification

| ITEM | SPECS | STANDARD |
|---|---|---|
| Sewing Thread | NOMAX SPUN THREAD 30's/3 & 45's/3 | NFPA 2112 , NFPA1975,ASTMF1506 |
| Metal Zipper | NOMAX TAPE BRASS TEETH#5 | NFPA 2112 , NFPA1975,ASTMF1506 |
| BUTTONS | METAL | NON RUST |
| REFLECTIVE TAPE | FR | NFPA 2112 ,EN469,BSEN ISO 14116 |
| VELCRO | FR | EN469 |

UltraSoft® UltraSoft AC® Indura®

WESTEX by Milliken

WESTEX UltraSoft

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Style 0301 UltraSoft 7 oz Twill
MPG S000100301
Fiber Content : 88% Cotton / 12% High Tenacity Nylon ( Jacket )

## When It Comes To FR Safety


PALET WARNA

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| BUTTONS | FR | EN469 |

WESTEX by Milliken

WESTEX UltraSoft

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## When It Comes To FR Safety


PALET WARNA

KEMEJA | CELANA

**Style 0301 UltraSoft 7 oz Twill**
**MPG S000100301**
**Fiber Content : 88% Cotton / 12% High Tenacity Nylon**

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| BUTTONS | FR FOR SHIRT, METAL FOR PANT | EN 469 , NON RUST |

**Style 0341 UltraSoft 5,5 oz Twill , ALSO AVAILABLE FOR SHIRT**

UltraSoft UltraSoft AC Indura

**PT. SAHABAT UTAMA SUKSESINDO**

**WESTEX BY MILLIKEN**