

FR GEAR

FLAME-RESISTANT WORKWEAR TO PROTECT WHAT MATTERS MOST.

IT'S MORE THAN A UNIFORM. IT'S A CARHARTT.

 **carhartt**
COMPANY GEAR™



Nothing's more important than putting your crew and their safety first. Industrial fires are no joke. Here's how we can help you combat them and keep you and your crew safe for the long term.

With the implementation of an FR program, sure, you need to stipulate NFPA 2112 certified garments, but there's more to consider. FR garment selection is a critical process. When you skip steps, or fail to acquire the proper equipment, you are putting workers at risk. So it's important to choose FR garments based on specific on-the-job hazards.

THERE ARE NO TYPICAL INDUSTRIAL FIRES.

There are many types and sources, and the duration and intensity can change based on the hazard.

Here are the four primary types of industrial fires:

FLASH

Rapid burning of vapor clouds

JET

Burning of pressurized fuel supply

POOL

Burning of flammable liquid spill

BLEVE BOILING LIQUID EXPANDING VAPOR EXPLOSION

Explosion and fireball from catastrophic failure of contained liquid

Fuel sources for these include flammable liquids, flammable gases and combustible dusts. Always remember that the magnitude of every fire is equal to the duration multiplied by the intensity. Duration and intensity are not always the same in each fire and can change based on the hazard.

Flash fire was a common industry term used for fire events when the NFPA and CGSB standards were first developed in 2000. Since then, NFPA 2112 and NFPA 2113 have been moving toward recognizing all fire and thermal hazards, rather than just flash fires. In fact, the wording in the purpose statement has been changed to include the term "short duration thermal exposure."

The manikin test was developed to provide a repeatable method that could easily and safely identify the proper PPE. For example, NFPA 2112 stipulates a 3-second, 2 cal/cm² exposure using test method ASTM F1930, thermal manikin test. According to OSHA 29 CFR 1910.132, it is the employer's responsibility to assess the hazard and identify the appropriate FR clothing to protect workers. OSHA 3151-12R 2003 requires employers to "...select PPE that will provide a level of protection greater than the minimum required to protect employees from hazards."

NFPA 2112 ESTABLISHES SPECIFIC CRITERIA FOR TESTING GARMENTS USING THE ASTM F1930 TEST METHOD AND THE ASTM D6413 TEST METHOD.

Using the ASTM F1930 manikin test, NFPA 2112 requires less than 50% body burn to pass. Garments are exposed to a 3-second engulfment fire at a 2 cal/cm² heat intensity and the total predicted is measured. **THE TEST LASTS THREE SECONDS FOR 2 REASONS:**

1 IN THEORY, THAT IS THE UPPER LIMIT OF FLASH FIRE DURATION.

2 IT IS THE AREA OF GREATEST VARIABILITY IN RESULTS, AFFORDING THE MOST ACCURATE DIFFERENTIATION OF FABRIC PERFORMANCE. THE UPPER LIMIT IS 50% BURN BECAUSE SURVIVAL RATES PLUMMET AS TBSA (TOTAL BODY SURFACE AREA) BURNS EXCEED THAT LEVEL.

- Garments must be cut to a standard pattern, size 42-RG coverall, and tested over 100% cotton t-shirts and briefs.
- The fabric must not melt, drip or have more than 2 seconds of afterflame or 4 inches of char length initially and after 100 launderings when using the ASTM D6413 test method.

Note: NFPA 2112 requires a maximum four-inch char length when a garment is tested according to ASTM D6413. ASTM F1506 requires a maximum six-inch car length when ASTM D6413 is used. If the fabric sample does not ignite and continues to burn entire length, char lengths at or below six inches are not meaningful predictors of thermal protective performance of the fabric or flash fire.



NFPA 2112 REQUIRES

- All garments must have a product label or labels permanently and conspicuously attached to each flame-resistant garment.
- All garments labeled as compliant with NFPA 2112 must meet or exceed all applicable requirements specified in this standard and shall be UL-certified.
- The UL certification organization's label, symbol or identifying mark shall be attached to the product label, be part of the product label or be immediately adjacent to the product label.

NFPA 2112 outlines four pass or fail tests for compliance: flame resistance, manikin testing, thermal shrinkage resistance and heat resistance.

THE INTENSITY OF AN INDUSTRIAL FIRE CAN VARY GREATLY BASED ON THE HAZARD.

This is a very important point to consider when selecting FR fabrics and garments to protect your team. Beyond the physical and mental anguish burn injury victims suffer, there can also be significant financial costs.

PER NFPA 2112, AN FR GARMENT NEEDS TO HAVE LESS THAN 50% TOTAL PREDICTED BODY BURN INJURY DURING A 3-SECOND, 2 CAL/CM² INTENSITY EXPOSURE TO PASS THE THERMAL MANIKIN TEST.

According to the American Burn Association, a survivor's medical costs associated with a

50% BURN INJURY CAN BE MORE THAN \$700,000

THESE COSTS CAN JUMP BY MORE THAN \$1 MILLION

AS THE BURN INJURY INCREASES PAST 70%

Medical costs are only the tip of the iceberg when considering other potential indirect costs such as OSHA fines, insurance claims, lawsuits and productivity losses.

Don't just settle for standard acceptance and shortcut your FR program. The financial cost of one severe burn injury can far outweigh the cost of a thorough hazard assessment and resulting FR PPE program. Compliance may not mean adequate protection for your workers. The purpose of FR fabrics is to reduce burn injury, provide the wearer escape time and increase his or her chance of survival. However, all FR fabrics are not created equal, and their performance can vary greatly, as shown in the results of the thermal manikin tests previously discussed.

Carhartt's FR clothing is expertly designed and rigorously tested to make sure your workers are protected. Because all the ratings in the world don't matter if your gear can't keep your crew safe when it matters most. We make the safest workwear on earth so you can protect your team.

For crews and companies making it happen, it's more than a uniform.

REFERENCES

1. NFPA 2112: Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire.
2. NFPA 2113: Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire.
3. "The SFPE Handbook of Fire Protection Engineering," Fourth Edition, National Fire Protection Association, 2008, 3-308-3-311.
4. Mudan, K.S., Hydrocarbon Pool and Vapor Fire Data Analysis, U.S. Dept. of Energy, DE85005857, Oct. 1984.
5. U.S. Dept. of Energy, Coyote Series Data Report, LLNL/NWC 1981 LNG Spill Tests, Dispersion, Vapor Burn, and Rapid-Phase-Transition, UCID-19953, Vol 1, Oct. 1983.
6. American Burn Association, 2013 National Burn Repository Annual Report, Version 9.0.

