

Personal Protective Equipment

Oil and Gas Flash Fire PPE, Limited-Flammability vs. Flame-Resistant Protective Gear

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Important work is sometimes dangerous. Chief among the many daily hazards faced by oil and gas workers is the ever-present risk of fire.

Industries take great care in preventing fires and explosions because they expose workers to extremely hazardous conditions. *OSHA indicates* that it is now recognized as practice to require flame-resistant clothing in the chemical and refinery industries. In fact, stepping foot onto an oil and gas operation site, such as a refinery, without proper flame-resistant PPE is virtually unheard of today.

Several stats worth noting:

- Fires and explosions are the **3rd most** fatal work injuries within the oil and gas industry.
- **16%** of all oil and gas fatalities are the result of exposure to fires and explosions, which cause devastating burns.
- Since 2003, there have been more than **1,500 fatal occupational injuries** in the oil and gas extraction industries.
- In 2017 alone, there were **23** fatal occupational injuries due to fire or explosions in the construction of or support activities for oil and gas extraction.

With the statistics shared above clearly showing fire as a concern for oil and gas workers, wearing proper PPE should not be taken lightly. While it is impossible to eliminate the risk of fire, the proper use of flame-resistant PPE can minimize injuries and save lives.

Below, MCR Safety provides deep insight into everything you need to know about the flame-resistant PPE options they offer. They educate consumers about the differences in protection options, including distinguishing between products that are labeled as having "limited-flammability" vs. true "flame-resistance". You can never be too well prepared when it comes to understanding the protective products available.



It has been 30 years since the devastating plant disaster in Pasadena, Texas, where 23 people died after a series of explosions caused by an ethylene leak.

30 Years Since the Devastating 1989 Pasadena Explosion

October 23, 2019 marked the 30th anniversary of the *plant disaster* in Pasadena, Texas, where 23 people died after a series of explosions caused from an ethylene leak. Inadequate safety procedures and cuts in necessary *refinery maintenance* work were determined to be contributing factors of the explosions.

In a report revised in March 2011, *FEMA outlined* lessons learned from the tragic Pasadena explosions.

Concerning worker safety, the Pasadena incident marked a major change in the PPE requirements across the oil and gas industry. During a recent refinery visit, a worker told MCR Safety that prior to the Pasadena explosions, workers wore whatever clothing they liked to work and very little of it was safety rated. After witnessing workers' clothing engulfed in flames and literally melting onto their bodies, however, the industry recognized that changes were needed to keep workers safe and to minimize the risk from fires or explosions.

When a major accident like the Pasadena explosion occurs, there are typically positive outcomes that transpire in the aftermath, once adjustments are made. In the case of PPE, workers now wear higher-quality flame-resistant garments and PPE. As a result of this horrible incident, there are now industry-wide flame-resistant clothing programs in place.

Limited-Flammability Garments

Flame-resistant apparel plays an important role for oil and gas workers because it mitigates burn injuries and provides insulation against second-degree burns. Yet safety managers and workers often overlook a key component: the material used. Generally speaking, flame-resistant clothing is either made from fabric whose fibers are inherently flame retardant or by chemically treating fibers in order to reduce flammability. Not all protection is the same, though.

"Limited-flammability" garments are, strictly speaking, not fire-resistant; they may melt or burn when they come in contact with an open flame. Items that are considered to have "limited-flammability"

have been chemically treated and tested to method **ASTM D-6413** to observe the materials' reaction to an open flame.

ASTM D-6413 is not a standard. It is only a test method that determines a textile's response to a standard ignition source. LF is highlighted by MCR Safety to show how the garment will self-extinguish within a matter of seconds, once the source of the flame is removed.

This type of clothing is best suited for workers who may have incidental contact with heat, heated objects, or flames, working in a capacity where short-term protection is needed. Originally, limited-flammability gear was developed for welders in the form of a protective vest, as welders required material that would not immediately catch fire from the flying sparks generated while welding.

By self-extinguishing, LF materials help reduce the potential of burn injuries when compared to straight PVC and polyester products not chemically treated with any flame-resistant properties. Click here to see a **video** showing an ASTM D-6413 open flame test.

Remember, LF garments are not intended for protection against flash fires.

Why True FR Protection Is Required in Oil and Gas: Flash Fires

Plant explosions, like the Pasadena disaster, are not the fire incidents that affect workers on a daily basis. Flash fires are much more common and are the hazard that concerns oil and gas workers mostly due to the serious thermal injuries a worker's body may sustain as a result.

A flash fire is a sudden, intense, rapidly moving flame that occurs in an environment where fuel, vapors, dust, and air combust. The vapors or particles that ignite and explode pose a serious threat to workers, causing extensive harm to both equipment and people. As **OSHA points out**, the intensity of a flash fire ultimately depends on the size of the gas or vapor cloud that ignites.

The potential likelihood of a flash fire rises during **upstream drilling** activities once drilling hits formations of hydrocarbons and gas. However, keep in mind that flash fires are present at all times across **midstream** and **downstream** oil and gas operations. Bringing well fluids to the surface by separation and storage poses a flash fire hazard for workers.

To combat flash fires, true flame-resistant clothing is an essential requirement for workers in the oil and gas industry. Non-FR clothing, such as PVC rain suits and even "limited-flammability" apparel, can ignite and provide an additional fuel source, dramatically increasing burn injuries.

Flame-Resistant (FR) Protection Meeting Industry Standards

Actual "flame-resistant" garments resist burning and withstand heat, thereby providing greater protection than limited-flammability garments. For oil and gas workers, true flame-resistant garments offer the best protection against flash fires because they will not ignite and continue to burn after a flash fire has ended. "Limited-flammability" garments will ignite, and should therefore be avoided if flash fires are a concern.

Flame-resistant garments are engineered with either inherently flame-resistant fibers that have flame resistance built into the material's chemical structure, or are chemically treated with higher quality flame-resistant materials. MCR Safety's inherent FR materials include Nomex® material and modacrylic/aramid blended fabrics. Acrylic fibers are a poor conductor of heat and are difficult to ignite.

The **National Fire Protection Association** (NFPA) is a leading resource on fire, electrical, and other related hazards. They set codes and regulations that define flame resistance standards. The **NFPA 2112**

Standard sets 17 different tests for garments to meet the flame-resistant protection standards for flash fire. Read the **complete blog** for a list of these tests as well as some of the limited flammability and flame-resistant PPE solutions for oil and gas workers that MCR Safety has to offer.

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