Is Your Team Protected?

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The proper tools and equipment are imperative for professionals of all kinds to do their jobs safely and effectively. But the obvious differences are many when comparing pencil pushers to those who engage in changing and uncertain environments, especially out in the field. Hazmat professionals in industrial and chemical companies rely on their hazmat suits for safety and protection.

On any given day these professionals could be confronted with toxic chemicals, noxious gases or the intense heat of flames. Their uniforms must be rugged and durable, yet advanced enough to allow them to perform their job duties and protect their colleagues from hazardous accidents.

For more than 100 years, the National Fire Protection Association (NFPA) has been the leading authority on fire protection and safety, and has developed many of the standards that hazmat and safety professionals rely on to keep them out of harm's way. However, NFPA standards can be confusing. And what's more, industry knowledge about the importance of purchasing NFPA-certified hazmat suits lacks.

One of the main points of misinterpretation is regarding two of NFPA's hazmat protective ensemble standards. The NFPA 1991 standard (Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies, 2005 ed.) defines the highest level of protection offered by the organization. Ensembles certified to the less stringent NFPA 1994 standard (Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents, 2007 ed.) often visually resemble those certified to the NFPA 1991 standard.

Some hazmat suits certified to the NFPA 1991 standard only meet the requirements when heavy aluminized overcovers are worn. Basically, these kinds of suits require that a suit be worn over a suit. When using these dual-layered ensembles, some hazmat users choose not to wear the overcovers either because their purpose is not understood or due to awkwardness and inconvenience, leaving them potentially and unknowingly unprotected.

Between the highly specific wording within the NFPA standards and inconsistency with which some manufacturers communicate the difference between them, understanding the right level of certification can be a tricky proposition.

NFPA—The Standard In Hazmat Suit Safety

NFPA certification represents the highest standard on the market in terms of hazmat suit protection because suits must pass the organization's rigorous tests of

physical and chemical resistance to achieve certification.

There are many tests that every hazmat suit must undergo before being certified. The flame resistance test consists of a flame source that touches the outside of a material with a three-second initial exposure (without allowing ignition) and a 12-second subsequent exposure. To meet NFPA 1991 requirements, the material must display no burning after 10 seconds, no burning greater than 4 inches, and no melting or dripping.

The primary chemical test method involves preconditioning the outside surface of the suit material by abrasion and flexure, followed by chemical exposure. The key point is to understand that the suit materials are subjected to damaging conditions prior to chemical exposure.

Not all NFPA 1991-certified hazmat suits provide flash fire protection as the requirement is optional. During this test, a suit is positioned inside a propane-filled flash chamber and must sustain a six- to eight-second flash exposure with an afterflame of no more than two seconds. After exposure, the suit must maintain airtight integrity and visual acuity in order to fully meet requirements. Companies that handle flammable chemicals or materials should opt for the flash fire option if aiming to offer the highest level of protection possible.

To really understand what level of protection is offered by a hazmat suit, it is important to look for the NFPA certification before making any purchase. Also, hazmat professionals must make sure their protective suits are worn according to certification standards. To reiterate, for dual-layered protective suits, discarding the overcover may expose the user to dangerous conditions.

NFPA 1991 Vs. NFPA 1994—What's The Difference?

To the untrained eye, many NFPA 1994 Class 2 ensembles are similar to those certified to NFPA 1991. However, a closer look reveals very significant differences in performance.

NFPA 1994 protection level requirements are less stringent than NFPA 1991 requirements for:

- Chemical testing.
- Vapor tightness.
- Flame resistance.
- Physical properties.

Distinct differences in performance encompass gas-tight integrity and flame resistance tests. To meet certification for NFPA 1991, hazmat suits must maintain at least 3.2 inches of water during the gas-tight integrity test, and a flame resistance of less than 10-second afterflame without melting or dripping after 12 seconds. By comparison, NFPA 1994 requirements for both of these performance characteristics are not applicable and do not require testing.

Other performance measurements also signal differences between the two certification levels. The burst strength for suits under NFPA 1991 is 45 LBF minimum, while for NFPA 1994, it is 35 LBF minimum. Similarly, the puncture/tear resistance and seam-breaking strength requirements for NFPA 1991 certification are greater than 11 and 15 LBF/inch, respectively, compared to NFPA 1994 requirements, which stand at a minimum of 7 LBF/inch for each measurement. The closure breaking strength is similarly disproportionate for each standard.

As if these disparities were not enough to clearly indicate the strong performance edge of NFPA 1991 certification, a look at the chemical permeation testing requirements for each certification further widens the margins. For abrasion preconditioning, NFPA 1991 certification requires 80 grit (coarse) for 25 cycles, while NFPA 1994 only requires 600 grit (very fine) for 10 cycles.

The NFPA 1991 standard requires hazmat suits to withstand 19 different toxic industrial chemicals, six different gases and two warfare agents. By contrast, the NFPA 1994 standard requires suits to withstand three toxic industrial chemicals, two gases and two warfare agents. In the 2007 edition of NFPA 1994, the permeation requirements were loosened. Rather than measuring for a maximum allowable detection level, the standard now allows for a cumulative amount of chemical to permeate.

Let’s face the obvious: Emergency personnel have enough to worry about in hazardous situations without having to be concerned about whether their hazmat suits fully protect them. While at first glance, suits certified to the NFPA 1994 standard may appear similar to those developed to meet the far more stringent NFPA 1991, a closer look reveals the vast differences in protection between the two.

Understanding the differences between the NFPA standards is one way to ensure that you and your team are fully protected. Hazmat professionals deal with plenty of unknowns; being certain about their hazmat suit’s certification is one worry they can easily avoid.

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