

**Jeffrey O. and Grace G. Stull**

PPE Update

Firefighter station wear: What certification means

Not all station wear is created equal; here's what NFPA certification means and how it evolved

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While firefighters' on-duty work uniform is not personal protective equipment per se, it can have a variety of protective functions when worn in conjunction with personal protective equipment.

For example, when worn under turnout clothing, the work uniform will provide additional insulation to those portions of the body that are covered by the work uniform. Or, work uniforms worn during emergency medical calls might serve to attenuate blood or body fluid exposure.

Adopted in 1985, NFPA 1975: Standard on Station/Work Uniforms, was intended to specify work uniforms that were constructed of flame-resistant materials. Consequently, requirements were put in place that materials used in these uniforms be flame resistant as well as heat resistant.

The latter property was considered important because heat resistance provided a demonstration that the material would not melt under adverse conditions.

Materials such as polyester or nylon can be treated for flame resistance, but will generally melt and make burn injuries worse than those from natural fibers such as cotton, which when burned turn into ash instead of molten resin.

Looking back

In the early years after NFPA 1975 was adopted, some departments relied on the pants portion the uniform to provide a significant layer of insulation for the firefighter's lower torso. This preceded the use of modern turnout clothing when long coats and high boots were worn.

The practice fell out of use when it was argued that firefighters did not always wear the correct work trousers and that the insulation levels provided by turning out clothing were superior to that of any conventional pants.

During this time, some fabrics relied on flame-retardant treatments in contrast to flame-resistant fabric such as those Aramids that retain the flame resistance properties over their entire service life.

It was believed that retardants could eventually wash out. This was handled by adding requirements to NFPA 1975 to demonstrate that the materials used in station work uniforms would remain flame resistant after at least 100 wash cycles.

Cost and comfort

The philosophy of having a standard that dictated use of flame- and heat-resistant work uniforms prevailed through 1994. However, there was a clear division in the fire service about the acceptability these uniforms.

Many departments considered this type of clothing relatively expensive, partly due to the certification costs and the increased cost of material used. For organizations concerned about appearance, the uniforms did not have the crisp appearance typically associated with polyester and cotton blends, which tend to hold creases better.

Moreover, there were a number of complaints about comfort. Many flame-resistant materials are considered too "boardy" and lacked reasonable moisture absorption.

Further, some argued that turnout clothing or other emergency clothing was intended to provide protection based on its own properties without reliance on the work uniform.

Two classes

In 1994, NFPA 1975 was overhauled to provide two classes of performance — baseline heat-resistant uniforms that could be either 100% cotton or wool and flame-resistant uniforms. The base requirements included the same heat resistance test indicated above.

One hundred percent cotton was considered the preferred uniform material because unlike polyester it doesn't melt and was comfortable. Yet other changes were needed because the heat resistance would not eliminate all nylon and polyester fabrics, as some fabric blends could hold up under the test conditions.

This resulted in a new thermal-stability test that provided a way of showing how material could melt and stick to itself. The higher category of station work uniform requirements included the flame-resistance test.

During the past 20 years, certified work uniforms has remained a relatively low proportion of the overall fire service purchases. Those departments that specify flame-resistant work uniforms generally will buy garments that meet NFPA 1975 requirements.

Shunning certification

However, purchases of uniform elements including short sleeve shirts, polo shirts, T-shirts, and shorts remain low, even though offered by a number of companies as certified products. Fire departments realize that they can get noncertified items for lower cost and still satisfy the intent of the standard.

And there are those who simply ignores NFPA 1975. They either buy or allow their members to use clothing that simply would not be qualified, including polyester and cotton blends and new synthetic blends that melt or shrink relatively easily when exposed to high heat. Overall, the proportion the fire service uses uniforms that complies with NFPA 1975 is very small.

In 2014, NFPA 1975 went through yet another transformation. This time the same dichotomy of 100 percent cotton versus flame-resistant uniform criteria was maintained.

However, in foreseeing the multiple roles of firefighters and other emergency service workers in different types of responses, several optional requirements were established to demonstrate performance claims. The 2014 edition has optional requirements for odor resistance, water resistance and insect repellence.

Bugs, water and more bugs

Odor resistance seems to be a rather odd optional performance category. This criteria called for the fabric to have antimicrobial properties, which reduce bacteria.

Many of these bacteria create odor, but more significant is the fact that these bacteria are encountered often during emergency patient care and include diseases such as Methicillin-resistant *Staphylococcus aureus* (MSRA) and *Clostridium difficile*, bacteria usually associated with hospitals that are now becoming more prevalent in first responder exposures.

There is documented evidence that uniforms become carriers of these microorganisms from one patient to another and expose first responder. The use of antimicrobial finish in clothing may be one way of combating this type of exposure.

The requirement falls short of an antimicrobial claim because to do so would require testing and review within the realm of the U. S. Environmental Protection Agency and the Food and Drug Administration that regulates such claims. However, testing is in place within NFPA 1975 to show how materials can reduce the persistence of certain bacteria.

Water resistance was added based on a water absorption resistance test. This type of performance is considered useful for those applications where uniforms may readily pick up liquids, such as during emergency medical response. Uniforms that resist liquid absorption could be considered safer.

Some organizations desire materials that repel certain forms of insects, such as mosquitoes, that spread disease or discomfort to members. This technology has been readily adopted within the military and is primarily intended for outdoor operations.

NFPA 1975 remains established on the basis that the uniform itself should not contribute to firefighter or responder injury under adverse conditions. However, its evolution allows uniforms to adapt to fire service needs with potentially different performance characteristics. It will be interesting to see whether any these changes affords additional acceptance of the standard.


About the author

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Jeffrey and Grace Stull are president and vice president, respectively, of International Personnel Protection, Inc. They are members of several NFPA committees on PPE as well as the ASTM International committee on protective clothing. Mr. Stull was formerly the convener for international work groups on heat/thermal protection and hazardous materials PPE as well as the lead U.S. delegate for International Standards Organization Technical Committee 94/Subcommittees on Protective Clothing and Firefighter PPE. They participate in the Interagency Board for Equipment Standardization and Interoperability and have authored the book, "[PPE Made Easy](#)." Send questions or feedback to the Stulls via [email](#).

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