Jeffrey O. and Grace G. Stull

PPE Update

4 firefighting glove rule changes for 2017

NFPA is looking at different sizing and testing methods that would significantly change structural firefighting gloves

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Historically, gloves have drawn a number of complaints from the fire service. This is because it is difficult to protect the hands in the same fashion as protecting other parts of the body.

The hands have a lot of surface area with the fingers and thumb and not very much volume. This means serious trade-offs are needed to provide a functional glove with appropriate levels of dexterity and tactility and still create enough thermal insulation.

Recently, the NFPA technical committee responsible for NFPA 1971 finished its principal work on the next version of glove requirements that could go into effect as early as May 2017. There are four sets of changes that could radically affect some of the glove products being offered to firefighters.

1. Sizing system is radically changing
Instead of the traditional XXS to XXL graded sizing approach, the committee has proposed adoption of a completely different sizing convention that is based on index finger length and hand breadth instead of hand length and circumference.

The designations for these glove sizes will use the index finger length in millimeters (64, 70, 76 and 82) in combination with a hand width indication (narrow - N, wide - W and extra wide - XW). This system will be completely alien to many firefighters and will create confusion in the short-term. NFPA 1971 will require seven minimum sizes — 64N, 70N, 70W, 76N, 76W, 82N and 82W; these new sizes are unlikely to match up with field sizes.

These drastic changes are being undertaken following complaints from several user populations that glove simply did not provide the level fit needed, typically for narrow or small hands. These changes

are more consistent with a sizing system the military uses, which has enjoyed some success in accommodating fit for bulky gloves for a diverse population.

As the new sizing system is based on a similar scheme used within the military, a hand-sizing tool is available that can aid in determining the correct size for an individual. This tool works the same way a Brannock footwear device works for sizing shoes where the individual puts their hand on it and moves guides to indicate the size.

While some glove manufacturer's current sizes may simply be relabeled, introducing a narrow and wide width approach will likely mean that nearly every manufacturer will have to scrap certain sizes and replace them with narrow sizes.

2. Heat-resistance test
Currently, all gloves are tested at 500°F for 5 minutes to ensure that glove materials do not degrade during a high-heat exposure and do not adversely shrink — shrinking is believed to minimize the thickness of the air layer between the hand and the glove, which is essential for thermal insulation.

In the past, new gloves were first washed several times (causing some initial shrinking), had their length and width measured, and then had their dimensions rechecked after being in the oven. As part of that required testing, gloves were filled to capacity with glass beads to simulate the mass of the hand inside the glove during heat exposure.

Due to some industry concerns about gloves that easily shrink, the technical committee modified the test by having the dimensions taken before laundering and reducing the amount of glass beads inside the gloves. This means there is more room for gloves to shrink (since less of the glove volume is taken up) and the shrinkage will not be influenced by laundering.

At this time, it is unknown which materials will be affected, but certain thin types of leather may be adversely affected such as goat hide and pigskin. The full impact on available products will not be known until manufacturers make assessments of their current products.

3. Moisture barrier testing will use a harsher chemical
Glove moisture barriers are now evaluated for their ability to hold out fireground liquids such as gasoline, battery acid and firefighting extinguishing agents. The testing assesses whether the liquids break down glove moisture barrier and seams causing penetration and exposure to the hands.

The technical committee investigated different hydraulic fluids encountered throughout the fire service in pneumatic tools and at vehicle crashes. They learned that some forms of hydraulic fluid hydraulic fluids could cause certain moisture barriers used in gloves to dissolve.

Therefore, in the new NFPA 1971 edition, a more harsh form of hydraulic fluid will be specified that may cause some of the current glove products to fail. This will force glove manufacturers to find compliant moisture barriers or identify new chemical-resistant glove barrier materials.

4. Back of the hand thermal insulation
Currently, both the back and palm side of gloves are evaluated for their resistance to heat transfer

when in contact with a hot surface. The only difference in testing was that a higher pressure was applied to the back of the glove than the palm; it was believed that more insulation was needed on the back than the front.

This requirement provided better insulation on the back of gloves where firefighters typically are burned. However, the test method does not simulate the most common type of heat exposure, being primarily radiant heat to the back of the hand particularly as the gloved hand is clenching a tool or hose.

The committee is transitioning to a new stored-energy test that is based on a radiant heat exposure and is already used for assessing reinforcements on garment sleeves in the NFPA 1971 standard. In addition, the committee investigated how gloves being wet affecting their insulation qualities.

In current testing, gloves are evaluated in a near saturation condition, but some research has shown that lower levels of moisture can actually lead to quicker burn injuries. As a result, the proposed testing will evaluate glove insulation at lower moisture levels consistent with the likely maximum burn injury potential.

The full impact of this test method change is unknown. However, there is now more science behind the test requirement that will likely provide improved benefits for achieving an acceptable balance for thermal insulation and hand function in glove construction.

Overall, the combination of these changes are expected to transform the glove products offered to the fire service. Beginning in late 2017, an array of new glove products should come onto the market that offer improved fit and protection.

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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