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PPE Update

Firefighter PPE standards: Their responsible development

To ensure changes to PPE standards are not half-baked, there's a detailed and responsible procedure for idea to become reality

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Many who take an interest in the health and safety standards created by NFPA either genuinely appreciate their existence or at least have strong opinions one way or another.

Some only care that there is a standard that can be cited when they buy personal protective equipment. Others feel that the process is nothing more than a forum for manufacturers to create new requirements to fuel increased sales.

Whatever your disposition, we believe they fill an important need for balance in the industry and, most importantly, establish a minimum framework for firefighter and emergency responder health and safety.

It is true that standards often become the battleground for debates about the state of the industry and as means for introducing change. For example, consider self-contained breathing apparatus where the very first standard adopted in 1981 (the same as the number of the standard, NFPA 1981) simply indicated that SCBA should be NIOSH-certified, positive pressure and offer a minimum 30-minute service life.

That first edition was on the order of a couple of pages. NFPA 1981 is now 67 pages describing highly sophisticated requirements and test method.

Over the past multiple editions, the requirements have evolved to include a number of fire service oriented tests beginning with increased ruggedness, a full system heat and flame evaluation,

assessment of communications, the introduction of heads up displays, universal air connections, and chemical and biological protection.

Most recently changes were made to standard for improving the survivability of facepiece materials when exposed to radiant heat. What is interesting to follow in the course for this standard's history is the manner in which these changes were implemented.

Committees at work

NFPA is an open forum; anything it does should be open to the public. While the public does approach NFPA from time to time, the majority of standards development activity takes place wholly within the committees responsible for individual standards.

Committees attempt to act on the best interests of the fire and emergency services. But deciding which changes to consider and, more importantly, how and when to add requirements that can have a substantial impact on your health and safety is no easy matter.

While there can be no price for an individual's safety and life, most changes in firefighter PPE come at a large expense to the industry. So, choices for introducing new methods and criteria that raise the bar have to be judiciously examined.

Despite their best intentions, some committees have introduced requirements that are either not ready or not completely thought out. Generally, changes are made to a standard to reflect improvements in technology or in the better understanding of how that technology works to provide protection.

It's often debated whether a changed test method will achieve a product improvement. For example, despite the inclusion of many new methods for testing firefighter gloves, all aimed at improved hand function, the reality is that most gloves offer the same overall dexterity — primarily because tradeoffs for thermal protection are difficult to meet.

Regardless of whether the requirement works on not, the impact of a test can be additional cost for the product's evaluation that often translated to more expensive products. Therefore, it is important to get it right before making the change.

Within the structure of NFPA there is a correlating committee for PPE that oversees the activity of all of the individual technical committees that write standards on different items of PPE. Its principal function is to ensure that PPE standards are prepared with consistent requirements, although it does not replace the technical committee deliberation on specific technical matters.

In the area of new test methods and criteria, it has instituted guidelines to validate new or significantly revised test method and criteria that include a relatively robust series of six steps intended to ensure that changes are carried out responsibly.

Step 1: Provide rationale

The submitter must provide a rationale with supporting evidence that substantiates the need for establishing new or revising test methods or criteria. This covers field relevance, fire service needs,

safety concerns, recognition of new product technology, accounting for advances in testing technology, or accomplishing other clearly stated objectives.

Examples of supporting evidence can include the documentation of specific safety issues identified by end user or other groups. This may include statistics on the number of incidents or highlight specific cases where the issues have arisen.

Other forms of supporting evidence can include aspects of existing requirements that unduly prevent proper testing or consideration of new product technologies because the existing test methods or criteria are found to be design-restrictive. Or, it may include information that shows that new test methods provide more reliable or relevant forms of evaluation. Scientific papers, test data or statistics provide a more robust justification for supporting evidence.

Step 2: Conduct assessment
The submitter must conduct an assessment to determine the potential impact of the new or significantly revised test methods or criteria on products that have already been certified or fielded.

The nature of this requirement is to have the technical committee assess what the anticipated impact of the new or modified requirements are relative to specific products.

This is not intended to identify specific products that might be excluded by a new or modified requirement. Rather, it requires the submitter provide an analysis for the types of products that might be affected, with an indication as to why the affected products do not provide adequate performance.

Step 3: Establish repeatable test
They also must establish intra-laboratory repeatability and inter-laboratory reproducibility for new or significantly revised test methods. Where possible, test methods shall include procedures for their calibration.

The principal certification organizations and their laboratories shall formally affirm to the technical committee that the tests can be conducted reliably as proposed at least by the time of the second draft.

This information is important for establishing the reliability of the test method and should, at a minimum, include those laboratories that provide certification services for the relevant product standard. This information may also be useful in setting specific criteria to account for expected test method variability.

Step 4: Show relevance
It is also required to establish the relevance of test methods and any associated criteria by showing how proposed or significantly revised test methods identify meaningful differences in product performance consistent with field performance.

One approach is to identify product types that are considered unsuitable based on end user field experience and evaluate those products alongside others to determine if the test method identifies meaningful differences in performance consistent with observed field performance.

Another approach is to demonstrate the impact and relevance of test results for products through carefully designed experiments carried out in the field. Lastly, an additional approach is to relate proposed criteria to specific safety levels that can be documented through scientific or other reasonably based field investigative work.

Step 5: Provide data
It is necessary to provide test data and any supporting documentation to the members of the respective technical committee, the correlating committee or individuals who may request this information.

Supporting documentation includes, but is not limited to, proposed new or modified methodology/criteria with justification statements, supporting evidence, test data, references to published papers or statistics, inter-laboratory test results and other information. The committees should maintain this as part of meeting minutes or make it available elsewhere on the NFPA technical committee website page.

Step 6: Provide visuals
Visual illustrations of the proposed test equipment and test materials help committee members and others better understand the proposed new or modified test. Those visual materials can be illustrations, videos or photographs.

Some may deem this long list excessive. But everything being requested is consistent with the import for how a significant change can affect firefighter health or safety or influence the type of PPE products they are provided.

Instead, we think this list is rather intuitive and in many cases, these steps are already followed.

However, when they are not followed and new methods or criteria are prematurely introduced or not properly justified, they can have enormous consequences. At least with an articulated process, there can be responsible standards development.

About the author

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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