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PPE Update

When firefighter PPE standards conflict

Balancing different committee recommendations, integrated equipment and technological advances in personal protective equipment

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The majority of standards applied to personal protective equipment are intended to establish minimum levels of performance that are deemed appropriate as developed by the individual technical committees that engage in creating product requirements.

A variety of checks and balances are put into the standards development process by the **National Fire Protection Association** to ensure that no given interest group dominates decisions or has undue influence. Committees include firefighters and other end users, labor representatives, manufacturers, research and testing facilities, and subject matter experts. Moreover, there are multiple periods of review afforded to the public to ensure that all issues are considered.

Given the fact that there are several different types of PPE used by the fire and emergency services, individual committees have been established to provide specific expertise for each particular product area. These include technical committees for respiratory equipment, electronic equipment and other committees that have been classified by the relevant emergency operations such as:



Missions change, new hazards are identified and advanced technology comes to the forefront. (Photo/U.S. Fire Administration)

- Structural/proximity firefighting,
- Wildland firefighting,
- Special operations,
- Hazardous materials response, and
- Emergency medical services.

Overseeing these groups is a separate correlating committee whose principal function is to adjudicate conflicts among the different standards where possible. The correlating committee further encourages each of the technical committees to go through robust processes of ensuring that requirements are validated and remain consistent among the different standards.

STANDARDS ADAPTATION TO INDUSTRY PPE CHANGES

One of the emerging problems of having different standards for different types of operations and equipment is the fact that the world we live in is constantly evolving. Missions change, new hazards are identified and advanced technology comes to the forefront. Since it takes a considerably long period of time for standards to be initially developed and – then with revisions occurring nearly every five years – standards do not always keep pace with the changing landscape of the fire and emergency services.

Thus, standards tend to be reactive than proactive, and simply cannot always reflect the latest and greatest protection approach. In defense of the standards, attempts are made to emphasize needed performance rather than dictate design. Nevertheless, in some cases, the way that some products are tested becomes de facto design restrictions.

In addition to the individual areas of standards development, we are seeing trends towards the integration of equipment. The need for this integration is becoming more and more apparent, and certainly there are some applications where it is now more the rule than the exception.

For example, hazardous materials response generally requires clothing outfits with integrated gloves, footwear and respirators in order to provide a uniformly protective envelope to the individual wearer during certain high-risk operations. As a case in point, the Ebola crisis showed how inadequate general emergency medical protective clothing and equipment was in terms of completing an ensemble to allow no exposed skin.

In the arena of firefighting, there is increased promotion of integrated equipment particularly as related to the **self-contained breathing apparatus** helmet, which seemed to be natural as platforms are adding new features, particularly those that are electronic in nature.

Nearly two decades ago after the introduction of personal alert safety systems, a natural combination of equipment was the option of having the PASS integrated into SCBA. This approach not only reduced the number of items for firefighter to keep track of, it also added a benefit of ensuring that the item would turn on when needed as going on air automatically activated the PASS device. These trends for integrating equipment have been a step towards creating greater functionality for first responders.

INTEGRATING STANDARDS ON COMBINED PPE PRODUCTS

In principle, combining products that are covered by different standards should be straight-forward. However, several problems can ensue unless joint consideration is given to how the items are put together.

Outside of hazmat, most organizations that purchase PPE assume the role of the integrator, meaning that they have to account that their selection of different items meant to be worn together actually will function as an ensemble in order to provide the needed protection, functionality and comfort for continued wearing of the item under hazardous conditions.

Certainly, it is one thing to think that the structural **firefighting gloves** will work reasonably well with the sleeves of the structural firefighting coat, such as providing sufficient overlap and ensuring that the protection stays in place at the area of interface. This is partly why most coat manufacturers use thumb loops or tabs to keep the end of the sleeve lining in place for proper integration with the inside of the gloves.

Other areas do not always work out as well. There are both prior and current SCBA face pieces, which based on their design, make it difficult to properly interface with a protective hood for structural firefighting ensembles. Other complaints have arisen from different helmets simply not fitting together properly, and potentially resulting in compromised protection or simply being uncomfortable and nonfunctional.

A specific issue has arisen for the integration of thermal imaging cameras and self-contained breathing apparatus. There are separate standards on both types of equipment – NFPA 1981 for SCBA and NFPA 1801 for TICs. Recent market offerings for combining these capabilities have resulted in new products, which create conflicts for compliance with both standards. Unlike PASS that has separate criteria in its standard (NFPA 1982) that recognizes that PASS can be either standalone devices or integrated into SCBA; this is not the case for NFPA 1851 thermal imaging cameras.

Many of the requirements that are established for TIC anticipate that the product will be a separate carried item. Therefore, some consternation results when a product appears in the marketplace showing a thermal imaging capability combined with NFPA 1981-certified SCBA where the TIC-like component does not meet all the criteria of the separate NFPA 1801 standard.

On the other hand, many in the fire service see the benefit of integrated technology that allows operational benefits by providing thermal imaging capability without having to carry additional equipment. Thus, the question arises as to how can these new capabilities be rationalized within the current framework of standards.

PPE STANDARD COMPLIANCE GAPS

It is often difficult for standards to anticipate and properly address new technology, particularly when various product elements begin to merge into one another. The desire to offer firefighters and other first responders new capabilities that improve their health and safety does have to be balanced against ensuring minimum levels of performance.

Manufacturers do have to take care for positioning new products that do not necessarily fit within the current scheme of product criteria established by existing standards. Yet, we believe that new ways are needed to be more proactive in the standards development process so that combined technologies, which offer significant advantages, can be both properly vetted and allowed to progress within the industry.

Generally, it is expected that ensemble integration and performance will need to be addressed in a more holistic manner than currently afforded by the current processes for standards development. Certainly, no one wants to see a digression from the relatively high levels of compliance for the many products covered by standards within the fire and emergency services.

On the other hand, standards will not always stay abreast of technological improvements. Therefore, new approaches such as creating generalized ensemble or PPE system performance requirements should be implemented to fill the compliance gaps among existing criteria to help avoid future conflicts among standards while allowing the most advanced technologies to be made available to our first responders.

The views of the author do not necessarily reflect those of the sponsor.

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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