

**NFPA 1970-P2025 Edition**

***Standard on Protective Ensembles for Structural and Proximity Firefighting, Work Apparel and Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services, and Personal Alert Safety Systems (PASS)***

**TIA Log No.: 1792**

**Reference:** Various in Chapters 3, 4, 6, 9 and Annex H (re: PFAS)

**Comment Closing Date: July 26, 2024**

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[www.nfpa.org/1970](http://www.nfpa.org/1970)

1. Add a new definition 3.3.219 Total Fluorine and associated Annex to read as follows and renumber subsequent definitions:

**3.3.219\* Total Fluorine.** A measurement that includes organic and inorganic fractions of fluorine.

**A.3.3.219 Total Fluorine.** The measurement of total fluorine is used as a surrogate or proxy estimate technique for the total amount of PFAS in a material or component by determining the amount of fluorine in the sample. Because total fluorine measurements can include findings for both non-PFAS organic chemicals as well as inorganic fluorine-based chemicals, total fluorine measurements are likely to overestimate the levels of PFAS found in any material or component sample.

2. Revise Annex A.3.3.133 PFAS to read as follows:

**3.3.133\* PFAS.**

An abbreviation for perfluoroalkyl and polyfluoroalkyl substances, which are a class of organic chemicals containing at least one fully fluorinated carbon atom.

**A.3.3.133 PFAS.** There are various ways PFAS is defined, ranging from specific target analytes with registered chemical abstract service (CAS) numbers to the group of specific chemicals as a ‘family’ or class of substances.

For this standard, the definition of PFAS is based on the US. House of Representatives (HR 5987, *The PFAS Definition Improvement Act*) November 2021 amendment to Section 8(a)(7) of the *Toxic Substances Control Act* (15 U.S.C. 2607(a)(7)) where the phrase “that contains at least one fully fluorinated carbon atom,” was inserted after “perfluoroalkyl or polyfluoroalkyl substance”. This and other definitions have been used by different regulatory authorizations and other organizations.

An alternative definition for PFAS is “fluorinated substances that contain at least one fully fluorinated methyl or methylene carbon atom, which are primarily categorized through the presence or absence of a nonfluorinated functional group.” This second definition is derived from the 2021 OECD PFAS definition in the Organization for Economic Co-operation and Development (OECD) publication, “Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance.”

In this standard, the presence of PFAS is determined using an analytical test that detects and quantifies all possible PFAS using currently available state-of-the-art technology for measuring the total fluorine content in materials. A while a different set of tests is applied for detecting and quantifying specific PFAS chemicals that are found in materials and components subject to restricted substance requirements in this standard.

3. Add a new paragraph 4.3.9.6 to read as follows:

**4.3.9.6** Suppliers of recognized components shall be permitted to make specific claims related to the PFAS levels in their specific materials or components according to 6.1.7.5, which in

turn can be applied by protective elements manufacturers as the basis of their optional claims according to 6.1.7.5.

4.3.9.6.1 Suppliers of recognized components shall be permitted to provide a certificate with test results demonstrating compliance with the optional claim where the organization performing the testing meets the following requirements:

(1) The test organization shall be independent from the supplier.

(2) The test organization is accredited in accordance with the requirements of ISO 17025, General requirements for the competence of testing and calibration laboratories, for performing total fluorine by combustion ion chromatography.

(3) The test organization shall provide a separate test report along with the certificate that meets the requirements of 6.5.11 and 6.5.11.1.

4. *Revise paragraph 6.1.7.5 and add new associated Annex A.6.1.7.5 to read as follows:*

~~6.1.7.5\* Where claimed, protective elements represented as having no measurable PFAS, including in any material, component, or their constituents, or as part of the protective element, shall be permitted to include as part of their label the following additional language where the required evidence is presented as specified in 6.5.11:~~

~~THIS [type of protective element] IS PFAS FREE BASED ON A MEASUREMENT OF TOTAL FLOURINE BELOW 1ppm.~~

Manufacturers shall be permitted to include the following statement as part of their product label where the required evidence is provided as specified in 6.5.11 for indicating PFAS levels in the respective protective element:

THIS [type of protective element] UPON CERTIFICATION HAS A PFAS (TOTAL FLUORINE) CONCENTRATION OF NO MORE THAN 100 PPM.

A.6.1.7.5 There is currently no standardized or technically practical way to fully determine the exact amount of all PFAS chemicals that might be present in a protective element. However, there are accepted industry practices for measuring the total fluorine in a given material or component that have been used for representing the total PFAS that might be present. The current techniques for measuring total fluorine will report fluorine levels that potentially include fluorine from both organic fluorine chemicals as well as inorganic fluorine chemicals that are not considered PFAS.

It is further recognized that while manufacturers or their suppliers might not intentionally add or believe PFAS has been added to a specific material or component, PFAS might still be present at measurable levels in the tens to hundreds of parts per million based on contaminated raw materials, fabrication processes, or various ways of handling materials. Some regulatory bodies have established limits for PFAS that account for some level of measurable total fluorine or total organic fluorine. A method for total organic fluorine had not been standardized at the time this standard was completed. Nonetheless, the prevailing limit for total fluorine in products has been established as 100 ppm for textile-based products in the following publications: *California Safer Clothes and Textiles Act (AB 1817)*, the 2024 edition of OEKO-TEX Standard 100, and the 2024 edition of the AFIRM Restricted Substances List. Consequently, the limit of 100 ppm of total fluorine has become an acceptable practice for distinguishing between products that have “intentionally added” PFAS and those that do not.

Manufacturers choosing to apply this language as part of their label are encouraged to provide supplemental information as part of their user information that helps explain the specific total fluorine measurements that apply to their certified protective elements.

5. *Revise paragraph 6.5.11 and associated Annex, and add new 6.5.11.1 with associated new Annex to read as follows:*

**6.5.11\*** ~~If the manufacturer makes the claim permitted in 6.1.7.5, “THIS PROTECTIVE ELEMENT IS PFAS-FREEBASED ON A MEASUREMENT OF TOTAL FLUORINE BELOW 1 PPM”, then the claim shall be based on test results when their protective elements are evaluated as specified in 9.10.2, Test for Total Fluorine verified as specified in Section 8.21.~~

~~A.6.5.11 The requirement provided in Section 8.21 and the associated test method provided in 9.10.2 represents 9.10.1.1 represent the best available analytical testing test technology at the time this edition was finalized for determining the limited presence absence of all PFAS in products and might be subject to future updates as testing technology evolves.~~

6.5.11.1 If the manufacturer makes the claim permitted in 6.1.7.5, then the manufacturer shall make the report specified in 9.10.2.6.3 available to the authority having jurisdiction upon request. (See also A.6.1.7.5.)

6. Add new section 9.10.2 with any associated Annex to read as follows:

**9.10.2 Test for Total Fluorine.**

**9.10.2.1 Application.** This test method shall apply to any protective element for which the manufacturer is making the claim that is permitted in 6.1.7.5.

**9.10.2.2 Selection of Samples for Evaluation.**

**9.10.2.2.1 Protective garment samples shall include outer shells, moisture barriers, thermal barriers, and wristlet/garment-glove interface components.**

**9.10.2.2.2 Protective helmet samples shall include ear cover fabric material layers, textile-based suspension materials, and textile-based retention system materials.**

**9.10.2.2.3 Protective glove samples shall include glove principal textile-based fabric materials, including shells, moisture barriers, linings, wristlets, and any nontextile moisture barrier materials.**

**9.10.2.2.4 Protective footwear samples shall include all footwear upper principal textile-based fabric material layers, including any exterior layer(s), barrier layers(s), lining(s), and any nontextile barrier layers.**

**9.10.2.2.5 Protective hood interface component samples shall include all hood fabric materials, including the outer layer, inner layers (where different), and particulate-blocking layers, as applicable.**

**9.10.2.3 Samples.**

**9.10.2.3.1 The size of the respective samples from the applicable material or component shall be as specified in the specific procedure applied.**

**9.10.2.3.2 A minimum default sample size of 5 g (0.18 oz) shall be used if specimen size or weight is not specified in the selected procedure.**

**9.10.2.3.3 The selected samples shall include all specific nonseparable parts, layers, or attributes of the applicable material or component.**

**9.10.2.3.4 The selected samples shall be taken in the same way from each source material or component so that they are as identical as possible in representing the specific material or component.**

**9.10.2.4 Specimens.**

**9.10.2.4.1 A minimum of three specimens taken from separate unique lots for each applicable material or component shall be evaluated.**

**9.10.2.4.2 Each specimen shall represent all parts, layers, or attributes of the applicable material or component being tested.**

**9.10.2.5\* Procedure.** Total fluorine shall be measured in accordance with ASTM D7359, *Standard Test Method for Total Fluorine, Chlorine, and Sulfur in Aromatic Hydrocarbons and Their Mixtures by Oxidative Pyrohydrolytic Combustion followed by Ion*

Chromatography Detection (Combustion Ion Chromatography–CIC), or an equivalent method for total fluorine by ion chromatography, with the following modifications:

(1) Only total fluorine shall be measured.

(2) The total fluorine measurement shall be reported in ppm.

A.9.10.2.5 An equivalent combustion ion chromatography procedure is described in “Combined use of total fluorine and oxidative fingerprinting for quantitative determination of side-chain fluorinated polymers in textiles,” (Liagkouridis, I., et al.).

**9.10.2.6 Report.**

9.10.2.6.1 The total fluorine measurements for each specimen of each tested material and component shall be reported.

9.10.2.6.2 The average total fluorine measurement of all specimens shall be reported.

9.10.2.6.3 A separate laboratory report shall be prepared on the total fluorine results of all applicable materials and components specific to the protective element for which the product label claim in 6.1.7.5 is being made.

9.10.2.6.4 The laboratory report shall include the following information:

(1) The name and address of the laboratory.

(2) The specific procedures used for the measurement of total fluorine.

(3) The specific laboratory quality control procedures used in the measurement of total fluorine.

(4) The individual specimen and average total fluorine results for each evaluated material and component of the subject protective element.

(5) An indication of the material or component that has the highest reported average total fluorine measurement.

9.10.2.7 Interpretation. The total fluorine concentration to be used as the basis of permitting the optional product label claim in 6.1.7.5 shall be the highest reported average total fluorine measurement of any materials or components that are evaluated for the respective protective element.

7. Revise Annex H.1.2.14 Other Publications as follows:

**H.1.2.14 Other Publications.**

AFIRM Restricted Substances List, 2024. Apparel and Footwear International RSL Management Group. 10513 Santa Monica Blvd, Los Angeles, 90025.

California Assembly Bill (AB) 1817, *Product safety: textile articles: perfluoroalkyl and polyfluoroalkyl substances (PFAS)*.

Fabian, T., et al., *Firefighter Exposure to Smoke Particulates*, DHS AFG Grant #EMW-2007-FP-02093, Project Number: 08CA31673, 2010.

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Liagkouridis, I., Awad, R., Schellenberger, S., Plassmann, M. M., Cousins, I. T., & Benskin, J. P. (2021). “Combined use of total fluorine and oxidative fingerprinting for quantitative determination of side-chain fluorinated polymers in textiles.” *Environmental Science & Technology Letters*, 9(1), 30–36. [<https://doi.org/10.1021/acs.estlett.1c00822>]

Nowlen, S., “A Review of Research at Sandia National Laboratories Associated with the Problem of Smoke Corrosivity,” *Fire Safety Journal*, Vol. 15, Issue 5, 1989, pp. 403–413.

OEKO-TEX Standard 100, 2024, OEKO-TEX Service GmbH, Genferstrasse 23, CH-8002 Zurich.

Organization for Economic Co-operation and Development (OECD), “Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance,” *OECD Series on Risk Management*, No. 61, OECD Publishing, Paris, 2021. <https://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals/terminology-per->

[and-polyfluoroalkyl-substances.pdf](#).

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US. House of Representatives, HR 5987 – *The PFAS Definition Improvement Act*, in November 2021 to amend Section 8(a)(7) of the *Toxic Substances Control Act* (15 U.S.C. 2607(a)(7)).

**Substantiation: Overview.** The proposed revisions address clarifications to and provide for the implementation of a technically feasible alternative approach for addressing PFAS in protective elements. The second draft of NFPA 1970 contained provisions for manufacturers to add a claim that their protective elements were “PFAS-free” as based on the measurement of total fluorine. This language was placed in the second draft as an option for manufacturers and not as a requirement. When the Technical Committee decided on this approach, there was uncertainty as to the reasonableness and the validity of a 1 ppm limit, which was established at the time on the basis of the perceived detection limit for the total fluorine method involving a broadly applied combustion ion chromatography test method for textiles and related products. There was also missing details for which materials and components would be subjected to this test method and how the total fluorine measurements would be reported for the large range of materials and components that would be subject to this optional label claim.

The proposed revisions to the applicable sections use an approach that is based on reporting the maximum total fluorine measurement of specified materials or components used in the respective protective element for labeling purposes. These revisions further identify which materials are tested and provide additional details for how the testing is to be conducted based on an industry accepted method for the determination of total fluorine. This approach provides a means for which manufacturers can make claims relative to PFAS if they choose to do so as the labeling requirement is optional. However, the requirements standardize the language of the claim and describe the necessary evidence to support the optional claim, if made. Consequently, this approach provides information to allow the fire service and other end users can be consistently informed as to how PFAS levels are determined and reported to meet a specific demand not addressed elsewhere.

**History.** PFAS chemicals (per- and polyfluoroalkyl substances) were first introduced in the mid-20<sup>th</sup> century and quickly gained popularity due to their exceptional resistance to water, oily chemicals, and heat. These properties, as well as their durability, made them valuable additives for a variety of industrial and consumer-based textile products. In the firefighting clothing industry, protective clothing used PFAS chemicals in different materials to enhance firefighter protection from heat, flames, chemicals and other hazards encountered during firefighting operations. PFAS further enabled materials to absorb less water and fireground soils, and thus be easier to clean.

Over time, concerns began to emerge about the potential health and environmental impacts of PFAS chemicals where some studies revealed certain PFAS compounds, such as perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), persisted in the environment, bio accumulated in living organisms, and became linked to adverse health effects, including cancer, immune system disorders and reproductive issues. In response to growing concerns about PFAS, the U. S. Environmental Protection Agency (EPA), began taking action to address PFAS contamination and exposure. In 2016, the EPA issued health advisory levels for PFOA and PFOS in drinking water, and several states implemented regulations to limit overall PFAS use and exposure.

In 2018, Washington passed the Firefighting Agents and Equipment Law (Chapter 70A.400 Revised Code of Washington). This law restricts the manufacture, sale, and use for training of AFFF (aqueous film-forming foam), a firefighting agent that contains PFAS and also requires manufacturers of firefighting personal protective equipment (PPE) to notify buyers if their products contain PFAS. This law was in response to increased attention to the use of PFAS and has been followed by similar legislation in some other states specific to firefighter protective clothing, either requiring disclosure of PFAS in these products or leading to the phase-out of PFAS use.

In recent years, there has been a growing trend among firefighter organizations and protective clothing manufacturers to phase out PFAS-containing materials in favor of alternative materials and treatments that provide equivalent performance meeting NFPA 1971 requirements. This shift reflects concerns about the potential health and environmental risks associated with PFAS exposure and desire to prioritize firefighter safety and well-being.

***Specific Problem Being Addressed.*** Differences in regulatory requirements as well as the complexity surrounding the topic of PFAS have created disparate claims within the fire service industry with respect to PFAS use in firefighter protective clothing. Many organizations, both manufacturers and end users attempt to make claims that products are “PFAS-free” or use similar language for which the basis of the claim is uncertain. There are two key factors that lead to this uncertainty:

1. PFAS is actually a family of chemicals, which depending on the exact definition, can include 10,000 and up to several million chemicals. Currently, it is only possible to accurately measure approximately 100 individual PFAS chemicals because that represents the number of analytical standards that enable their precise measurement. Because of the situation, PFAS content must be measured indirectly and the environmental/product analytical laboratory industry has moved towards the use of total fluorine or related measures to assess PFAS in solid samples.
2. Given its ubiquitous use in a variety of different products, PFAS contaminates many materials and components, even when it is not directly and knowingly added to these items. This contamination can occur from water used in the processing of the material, from the use of certain raw materials, equipment that may have been contaminated, or how materials are handled and stored. Consequently, even when claims are made that there is no PFAS in a product, there can still be measurable levels of PFAS.

Many organizations within the fire service are making choices for protective clothing on the basis of whether they have been made with PFAS chemistry. Therefore, there is a genuine need to address the standardization of PFAS-content claims, which are used to inform these decisions.

***Approval Used for Proposing Specific Changes.*** The specific language proposed as part of this TIA was developed by a task group comprised of members appointed by the chairperson of the technical committee. While the origin of this task group began in 2018 under the correlating committee, the efforts of addressing the topic of PFAS claims relative to firefighter protective clothing began prior to the preparation of the first draft. The first draft included the statement indicating that manufacturers could be permitted to make a “PFAS-Free” claim when certain criteria were met to provide specific evidence that the respective protective element did not

contain PFAS but did not then provide a definitive test method. The task group continued its work on recommendations to the technical committee for preparing the second draft, where the language for having a permissive labeling claim was continued and refined.

In the final preparation of this TIA, the task group was assigned the responsibility for attempting to create a consensus set of proposed changes to the NFPA 1971 requirements of the proposed 2024 edition of NFPA 1970 to address PFAS content claims in firefighter protective clothing and equipment. The proposed amendment represents the consensus outcome of this task group. At the time of submission, there were no voting interests that expressed their opposition to the submission of this amendment.

It is important to emphasize that this additional claim has been supported throughout all aspects of the revision process for the new edition of the consolidated NFPA 1970 document within both the NFPA 1971 technical committee and the respective task group. There is nothing that prevents a manufacturer from continuing to use PFAS-based materials in the construction of the protective elements. Furthermore, nothing in these proposed changes or the prior language established in the first or second draft of the standard that prevents manufacturers for making any additional, supplemental claims.

Further, in its Notice of Proposed Rule Making related to the revision of 29 CFR Part 1910.156 and related regulations, the U. S. Occupational Safety and Health Administration (OSHA) is seeking input on whether scheduled updates to NFPA 1971 will address or alleviate stakeholders concerns about PFAS in PPE in Question k-4 of the OSHA “Questions and Issues Compiled from the Emergency Response Notice of Proposed Rulemaking” ([osha.gov/sites/default/files/ER\\_NPRM\\_Questions\\_and\\_Issues.pdf](https://www.osha.gov/sites/default/files/ER_NPRM_Questions_and_Issues.pdf))

***Further Substantiation of Specific Proposed Changes.*** Additional information on the individual proposed revisions by subsection of the changes include:

1. The Annex item for the definition of PFAS has been updated to include the observation that it can be defined differently by various groups and provides the basis of the current definition in the second draft.
2. A definition for “total fluorine” has been provided given its use as the basis for relating PFAS level claims in firefighter protective clothing products.
3. An option has been provided in new paragraph 4.3.9.6 to allow suppliers of recognized components (identified materials for testing) to apply the same claims as for the protective element to individual materials or components. This approach is seen as instrumental for the implementation of the optional labeling requirement by allowing recognized components that are reviewed by the certification organization to be part of the overall claim for the respective protective element. It also follows current practice for how protective elements are certified to NFPA 1971.
4. As described above, the specific permissible claim for the product label is now based on the reported maximum total fluorine concentration in the respective protective element, which can be related to PFAS but is known to overestimate the amount of PFAS since any chemical containing fluorine will become part of the detected quantity of fluorine. Nevertheless, the

use of total fluorine remains the only viable way for measuring all PFAS that may be present based on available analytical capabilities.

The specific limit of 100 ppm is based on a consistent application of a dividing line for what is believed to be intentionally added versus no intentionally added PFAS to a product to account for different forms of contamination as described in an earlier section of this substantiation statement. This very same limit is found in several sources, including California Safer Clothes and Textiles Act (AB 1817), the 2024 edition of OEKO-TEX Standard 100, and the 2024 edition of the AFIRM Restricted Substances List.

Additional information is provided in an Annex section that explains the basis for this approach and its limitations. It also suggests that manufacturers provide supplemental information as part of the user information guide to help explain to in users how this information may be interpreted if they choose to implement this claim.

5. Paragraph 6.5.11 has been revised for establishing the basis for making the claim by specifically pointing to the test method for which the determination of total fluorine content is made. It further requires that the manufacturer provide a report to the Authority Having Jurisdiction upon request as a way of providing disclosure to respective end users.
6. The test requirement has been decoupled from prior section 9.10.1, which addresses restricted substances in general. A new test method subsection has been created for the measurement of total fluorine based on the same principles as previously contained in the second draft. The proposed new test method cites a standardized test method, which is adapted for the measurement of total fluorine in textile or textile related materials. It provides the basis for the selection of specific materials to be evaluated for total fluorine, recognizing those major materials for which PFAS is likely to be found. Other details are provided for carrying out the method including how test measurements are to be reported and interpreted in terms of meeting the basis for a manufacturer being able to make the optional product label claim.
7. Additional references cited within the new or revised Annex A items are identified for inclusion in Annex H.

**Emergency Nature:** The standard contains an error or an omission that was overlooked during the regular revision process. The proposed TIA intends to correct a previously unknown existing hazard. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

- (a) The document contains an error or an omission that was overlooked during a regular revision process.  
As written, the standard cannot be complied with without a large degree of interpretation from the certification organization for implementing this potential requirement. There is specifically a lack of clarity around the materials to be tested and how test results are to be interpreted for basing the optional claim for which the certification organization has responsibility to execute.
- (c) The proposed TIA intends to correct a previously unknown existing hazard.  
These changes more accurately reflect industry practice related to being able to make a claim



distinguishing the product is having PFAS content that can be considered a hazard by some organizations in their selection of PPE.

- (d) The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

By providing a specific, standardized means of indicating PFAS content directly on the product label, ambiguity related to the PFAS content in the product is avoided and is made consistent in claims made by a manufacturer relative to its protective element products. This ensures that PPE selection decisions made on the basis of PPE are standardized for the purchase of products that comply with the NFPA 1971 requirements of the standard.

Anyone may submit a comment by the closing date indicated above. Please identify the TIA number, state whether you SUPPORT or OPPOSE the TIA along with your comment, and forward to the Secretary, Standards Council. [SUBMIT A COMMENT](#)