AGENDA

NFPA Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment (FAE-AAC)
NFPA 1850 Second Draft Meeting (Annual 2025)

December 17, 2024
1:00 p.m. – 5:00 p.m. (ET)

Web/Teleconference (Microsoft Teams)
To join the meeting, please contact Yvonne Smith (ysmith@nfpa.org)

1. **Call to order.** Rick Swan.
2. **Introductions.** See committee roster attached.
3. **Chair report.** Rick Swan.
4. **Staff liaison report.** Barry Chase.
5. **Previous meeting minutes.** July 30-31, 2024 (Quincy, MA). See attached.
6. **NFPA 1850 Second Draft.**
   a. **Review Public Comments and Second Revisions.**
      i. **Chair's Report for the Technical Committee on Structural and Proximity Firefighting Protective Clothing and Equipment (FAE-SPF).** Tim Tomlinson.
      ii. **Chair's Report for the Technical Committee on Respiratory Protection Equipment (FAE-RPE).** Albert Yanagisawa.
   b. **Correlating Revisions.**
7. **Task group report(s).**
   a. **Task Group on Recommendations to Improve the ERRS Consolidation Plan**. Rick Swan.
8. **Other Business.**
9. **Future meetings.**
10. **Adjournment.**

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MINUTES

NFPA Correlating Committee on
Fire and Emergency Services Protective Clothing and Equipment (FAE-AAC)
NFPA 1930, 1950, 1955 Second Draft correlating meeting
NFPA 1857, 1985 First Draft correlating meeting

July 30 – 31, 2024
NFPA Headquarters, Quincy, MA / Microsoft Teams

1. **Call to order.** Rick Swan, Chair, called the meeting to order at 8:00am on July 30, 2024.
2. **Introductions.** Attendees introduced themselves and identified their affiliation.
3. **Chair report.** Chair Swan welcomed attendees and provided an overview of the meeting.
4. **Staff liaison report.** Barry Chase, NFPA Staff Liaison, provided an overview of the standards development process and the revision cycle schedule.
   a. No members declared a conflict of interest or that they had been retained to represent the interest of an entity that would be classified in an interest category different from their own with respect to a specific issue or issues that were addressed by the committee at this meeting.
5. **Previous meeting minutes.** The minutes from January 16, 2024, [Microsoft Teams] were approved without revision
6. **NFPA 1930 Second Draft.**
   a. **Chair Report.** Christopher Sampl, Chair of the Technical Committee on Electronic Safety Equipment (FAE-ELS), reported on the key topics addressed in this draft. He also expressed that the committee is not in favor of the specific combination of topics in this consolidated standard, as it combines high-tech electronics with low-tech tools and also combines product standards with selection, care, and maintenance standards, which have different audiences and uses. The committee would prefer to separate thermal imagers and two-way portable RF communication devices from this consolidated standard. *See minutes item (11)(b).*
   b. **Correlating Review.** The Correlating Committee reviewed the work of the Technical Committees and developed Second Correlating Revisions as necessary. These will be available in the Second Draft Report at www.nfpa.org/1930next.
7. **NFPA 1950 Second Draft.**
   a. **Chair Reports.**

i. Jeremy Metz, Chair of the Technical Committee on Special Operations Protective Clothing and Equipment (FAE-SCE), reported on the key topics addressed by the committee for technical rescue personal protective equipment (Chapters 5 through 9) and the creation of a new chapter on multi-use protective equipment (Chapter 20).

ii. At the time of this meeting, the Technical Committee on Emergency Medical Services Protective Clothing and Equipment (FAE-EMS) did not have a chair. Jeremy Metz and Amanda Newsom, who served as interim chairs for the First and Second Draft meetings, respectively, provided a report on the key topics addressed by the committee for emergency medical operations protective equipment (Chapters 10 through 14).
Mr. Metz and Ms. Newsom reported that the Technical Committee's work throughout this revision cycle was plagued by process issues. The committee first met in February 2019 for the First Draft of NFPA 1999, but that revision cycle was canceled to allow NFPA 1999 to be consolidated into NFPA 1990 as part of the ERRS consolidation plan (nfpa.org/errs). The committee met again in January 2020 for the First Draft of NFPA 1990 and acted on the same Public Input. That revision cycle was again interrupted by the decision to remove NFPA 1999 from the NFPA 1990 consolidation and instead add it to the NFPA 1950 consolidation. Therefore, the committee met for a third time in January 2023 to discuss the First Draft of NFPA 1950, processing the same Public Input for a third time. Meanwhile, the committee chair stepped down, and staff was unable to recruit a new chair, which led to additional problems with respect to coordination of the three technical committees that work in NFPA 1950.

iii. At the time of this meeting, the Technical Committee on Wildland Firefighting Protective Clothing and Equipment (FAE-WFF) did not have a chair. Rick Swan, a Principal member of the committee, provided a report on the key topics addressed in by the committee for wildland and urban interface firefighting protective equipment (Chapters 15 through 19).

b. **Correlating Review.** The Correlating Committee reviewed the work of the Technical Committees and developed Second Correlating Revisions as necessary. These will be available in the Second Draft Report at www.nfpa.org/1950next.

8. NFPA 1955 Second Draft.

a. **Chair Report.** Jeremy Metz, Chair of the Technical Committee on Special Operations Protective Clothing and Equipment (FAE-SCE), reported that, to date, there have been no known products certified as compliant with either NFPA 1952 or NFPA 1953, which were combined to create NFPA 1955. Accordingly, the committee spent very little effort working on this consolidated standard and focused on NFPA 1950 during the revision cycle. NFPA 1955 still needs a lot of work before it would be usable as a certification standard. In part, the lack of products for testing is a barrier to gathering data and proving the efficacy of test methods. In addition, the need for protective clothing during

water operations is highly dependent on the concentration of contaminants, so there is a lack of reliable data on the need for water operations protective ensembles. Given these considerations, Mr Metz reported that the Technical Committee moved the consolidated draft forward only because a proposed OSHA ruling might require compliant gear. If this occurs, it could drive opportunities to test products, gather data, and refine the standard.

The Correlating Committee discussed the option to vote against moving NFPA 1955 forward in the process and send it back to the Technical Committee for additional work. The committee also discussed whether the NFPA 1955 consolidation should be eliminated (keeping NFPA 1952 and NFPA 1953 as separate standalone standards) or whether standards development in this topical area should be ended completely.

Mr. Metz offered to submit a request to the Fire Protection Research Foundation, on behalf of the committee, to study the need for continued standards development on water operations protective equipment.

b. **Correlating Review.** The Correlating Committee reviewed the work of the Technical Committees and developed Second Correlating Revisions as necessary. These will be available in the Second Draft Report at www.nfpa.org/1955next.

9. NFPA 1857 First Draft.

a. **Chair Reports.**

i. Jeremy Metz, Chair of the Technical Committee on Special Operations Protective Clothing and Equipment (FAE-SCE), reported on the key topics addressed by the committee for technical rescue personal protective equipment (Chapters 4 through 12).

ii. At the time of this meeting, the Technical Committee on Wildland Firefighting Protective Clothing and Equipment (FAE-WFF) did not have a chair. Rick Swan, a Principal member of the committee, provided a report on the key topics addressed by the committee for wildland and urban interface firefighting protective equipment (Chapters 13 through 20).

b. **Correlating Review.** The Correlating Committee reviewed the work of the Technical Committees and developed Correlating Notes and First Correlating Revisions as necessary. These will be available in the First Draft Report at www.nfpa.org/1857next.

10. NFPA 1985 First Draft.

a. **Chair Report.** Albert Yanagisawa, Chair of the Technical Committee on Respiratory Protection Equipment (FAE-RPE), reported on the key topics addressed by the committee for wildland and urban interface respirators (Chapters 4 through 8) and breathing air quality (Chapters 9 through 13).

As part of his remarks, Chair Yanagisawa expressed concern, on behalf of the committee, regarding the specific combination of topics in this consolidated standard and read a

prepared statement (attached), requesting to end development of this consolidated standard. *Refer to minutes item (11)(b) for further discussion.*

b. **Correlating Review.** The Correlating Committee reviewed the work of the Technical Committees and developed Correlating Notes and First Correlating Revisions as necessary. These will be available in the First Draft Report at www.nfpa.org/1985next.

11. Discussion on PPE Project Planning.

a. **Staff presentation on the Revision Cycle Schedule for NFPA 1990 and NFPA 2500.** Barry Chase presented the key dates for the upcoming revision cycle for NFPA 1990 and NFPA 2500.

b. **Committee and Document Scopes.** Chair Swan called for a critical discussion on implementation and structure of the ERRS consolidation project with respect to the specific document combinations, meeting schedules, document revision schedules, and other project details.

i. **NFPA 1990 + NFPA 1986 and NFPA 1987.** NFPA 1990 is a consolidated standard that was issued in 2021 and contains the requirements for vapor-protective, liquid-protective, and HAZMAT/CBRN protective ensembles and ensemble elements, which were previously located in NFPA 1991, NFPA 1992, and NFPA 1994, respectively. The committee views NFPA 1990 as the best example of a good consolidation and believes no further change is needed with respect to the combination of topics.

However, for the upcoming revision cycle, the Standards Council has approved a plan to consolidate the requirements for tactical and technical operations respiratory protection equipment (NFPA 1986) and combination unit respirator systems (NFPA 1987) into NFPA 1990. Public Input on all three documents will close on Sept 6, 2024.

This second round of consolidation was requested by the committees. Brian Montgomery, Chair of the Technical Committee on Tactical and Technical Operations Respiratory Protection Equipment, reported that this combination was requested only because staff strongly indicated that NFPA 1986 and NFPA 1987 must be consolidated. The committee wanted to have a say in where these standards would fit and felt that NFPA 1990 was the least objectionable option. However, the committee does not believe that this combination of ensembles and respiratory protection will result in any obvious benefit to users of the equipment; it will only serve to complicate the standard.

Jeff Stull expressed a similar opinion and mentioned that he had submitted a comment to the Standards Council appealing the decision to combine NFPA 1986 and NFPA 1987 into NFPA 1990.

The committee would like to explore the available options to reverse course on combining these three standards. Since NFPA 1986 and NFPA 1987 were only issued 2 years ago, these standards are not in need of revision and can be taken out of the current cycle.

ii. **NFPA 2500.** NFPA 2500 is a consolidated standard that was issued in 2021 and combines the requirements for technical rescue operations; life safety rope design, performance, and testing (product); and life safety rope selection care and maintenance (SCAM), which were previously contained in NFPA 1670, NFPA 1983, and NFPA 1858, respectively. The standard is about to enter its first revision cycle. Public Input will close on Sept 6, 2024. The correlating committee has purview only over the portions of the standard pertaining to life safety rope.

    Jeremy Metz, Chair of the Technical Committee on Special Operations Protective Clothing and Equipment, reported that the committee objects to the combination of a product standard and a SCAM standard and that the combination has resulted in confusion and problems in the field. In part, this is because the product standard is applicable to manufacturers and certification organizations, while the operations standard and SCAM standard are applicable to technical rescue personnel. In addition, from a standards development perspective, it is difficult for the technical committee to process both the product and SCAM requirements at the same time, since SCAM standards have traditionally been developed after the product standard is completed.

    The committee would like to explore the available options to separate the life safety rope product standard (formerly NFPA 1983) from NFPA 2500, leaving the remaining combination intact. The product content could potentially go back to being a standalone standard or be combined into NFPA 1930. *See the discussion on NFPA 1930, below.*

iii. **NFPA 1891.** No change needed with respect to the combination of topics.

iv. **NFPA 1970.** No change needed with respect to the combination of topics.

v. **NFPA 1850.** No change needed with respect to the combination of topics.

vi. **NFPA 1930.** NFPA 1930 is a consolidated standard that combines the requirements for thermal imagers, two-way portable RF communication devices, ground ladders, rescue tools, and fire hose, which were previously contained in NFPA 1801, NFPA 1802, NFPA 1932, NFPA 1937, and NFPA 1962, respectively. The standard is currently at the Second Draft stage. *See minutes item (6).*

    The committee would like to explore the available options to separate thermal imagers and two-way portable RF communication devices from this consolidated standard. This content could be combined into a new consolidated standard for electronic safety equipment.

    NFPA 1930 could be a good place for the life safety rope product requirements, if removed from NFPA 2500.

vii. **NFPA 1950.** No change needed with respect to the combination of topics.

viii. **NFPA 1955.** No change needed with respect to the combination of topics, but there are questions with respect to the value of completing the consolidation or continuing to develop the existing standards. *See minutes item (8).*

ix. **NFPA 1857.** No change needed with respect to the combination of topics.

x. **NFPA 1985.** NFPA 1985 is a consolidated standard that combines the requirements for wildland and urban interface firefighting respiratory protection equipment and emergency services breathing air quality, which were previously contained in NFPA 1989 and NFPA 1984, respectively. This standard is currently in the First Draft stage. *See minutes item (10).*

The committee would like to explore the available options to end development of NFPA 1985 and keep both NFPA 1989 and NFPA 1984 as standalone standards. Neither standard would be negatively impacted by shifting to a later revision cycle.

xi. **Other issues.** The committee noted several issues with the scheduling and management of the consolidation project.

- Members don't have input into the selection of meeting dates or locations, and the information is provided too late.
- Having all committees meet in a single week places a heavier workload on volunteers, especially those who serve on multiple committees or on committees with multiple standards.
- Having all committees meet in a single week requires some committees to have substitute staff liaisons, which increases the difficulty of running a smooth, error-free meeting.
- The document revisions are not timed to balance the workload over the five consolidation groups.
- The revision cycle schedules do not leave enough time between a product standard and its SCAM standard.
- Technical Committees don't have a holistic view of the combined standard.
- Technical Committees need control over their definitions, as is done for other multi-committee standards, such as NFPA 13, NFPA 72, NFPA 101, etc..
- The combination of topics into a single standard creates pressure to keep the document moving forward even when there are known issues that haven't been resolved.

xii. **Task Group on Recommendations to Improve the ERRS Consolidation Plan.** The committee formed a task group to review these discussion points and develop recommendations for improving the ERRS consolidation plan for PPE standards. The task group will report at or before the NFPA 1850 Second Draft Correlating Meeting in December 2024.

Task group members: R. Swan (Chair), C. Baxter, J. Metz, B. Montgomery, C. Sampl, T. Tomlinson, A. Yanagisawa, T. Diani, J. Stull, A. Newsom, J. Szalajda, S. Sanders

12. Other Business.

a. **Results of the 2024 NFPA Tech Session.** Chair Swan reported on the results of the Certified Amending Motions (CAM) that were submitted on NFPA 1970. Of the 14 motions that were certified, 8 were withdrawn in advance of the meeting, 5 were not pursued at the meeting, and 1 was moved but failed. Based on these results, NFPA 1970, as presented in the Second Draft Report, will move to the final stage of the process and be considered by the Standards Council for issuance.

   It is anticipated that the technical committees will likely establish task groups to develop tentative interim amendments that address some of the CAM submitters' concerns.

b. **NFPA 1970 Tentative Interim Amendments (TIA).** There are 12 TIAs in process on NFPA 1970. These will be considered by the Standards Council for concurrent issuance with the new standard.

c. **NFPA PPE Project Landing Page.** The committee requested NFPA staff to set up a page on the NFPA website dedicated to the PPE project. The page would provide a complete, chronological list of Correlating Committee meetings, across all PPE documents, and would contain relevant committee resources, such as the test methods guidance document that was previously issued by the Correlating Committee.

13. Future meetings. The following meetings are anticipated through December 2025:

- NFPA 1850 Second Draft CC Meeting. [December 2024]
- NFPA 1990, 2500 First Draft CC Meeting. [June 2025]
- NFPA 1857, 1985 Second Draft CC Meeting. [July 2025]
- NFPA 1990, 2500 Second Draft CC Meeting. [December 2025]

Meeting notifications for these and any additional meetings will be posted on the NFPA webpage for the subject standards.

14. Adjournment. The meeting was adjourned at 4:20pm on July 31, 2024. The committee did not meet on August 1, as originally scheduled.

Attendees

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✓	**Sampl, Christopher**	Nonvoting Member	TC on Electronic Safety Equipment
✓	**Tomlinson, Tim**	Nonvoting Member	TC on Structural and Proximity Firefighting Protective Clothing and Equipment
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-	***VACANT***	Nonvoting Member	TC on Wildland Firefighting Protective Clothing and Equipment
-	***VACANT***	Nonvoting Member	TC on Emergency Medical Services Protective Clothing and Equipment
✓	**Chase, Barry**	Staff Liaison	National Fire Protection Association
✓	**Yvonne Smith**	Committee Administrator	National Fire Protection Association

Guests:

Shane Coots	White's Boots
Chris Archibald	Stedfast
Karine Martin	Innotex
Jennifer Wise	Gore
Marni Schmidt	Fortunes Collide
Chad Morey	Draeger
Sarah Frey	Phenix Technology
Melisa Sanchez	Phenix Technology
Christina Stull	International Personnel Protection
Luke Votaw	Gore

Total number in attendance: 35

MINUTE ITEM #10(A) ATTACHMENT
LETTER FROM A. YANAGISAWA

Rebuttal to the NFPA ERRS Standards Consolidation Plan

Addressing Concerns about the Consolidation of NFPA 1984 and NFPA 1989

While the NFPA Standards Council's plan to consolidate information contained in 114 NFPA Emergency Response and Responder Safety (ERRS) standards into 38 overarching standards is commendable for its intent to streamline and simplify access to critical safety information, we respectfully raise concerns regarding the proposed consolidation, specifically relating to NFPA 1984 and NFPA 1989.

Upon comprehensive review, it is our assertion that NFPA 1984 and NFPA 1989 address distinct and critical aspects of respiratory protection for first responders. NFPA 1984 is tailored to meet the specific challenges and requirements of wildland firefighting, which significantly differ from the scenarios addressed by NFPA 1989, particularly concerning the standards for breathing air quality.

Key Points of Concern

1. Specialization and Clarity:

NFPA 1984 and NFPA 1989 cover highly specialized aspects of first responder safety that require clear, focused guidelines. Combining these standards risks diluting the specialized guidance necessary for effectively addressing the unique challenges of each area. Wildland firefighting presents distinct hazards and operational environments that demand tailored respiratory protection protocols, which NFPA 1984 provides in detail. In contrast, NFPA 1989 focuses on the quality standards for breathing air, essential for different types of emergency services.

2. Operational Efficiency:

Keeping these standards separate allows for more specific training, equipment selection, and operational planning. Each set of standards aligns with the unique conditions and requirements of either wildland firefighting or emergency services respiratory protection. Consolidation could lead to ambiguity, potentially reducing the effectiveness of training programs and the appropriateness of equipment choices, thereby compromising operational efficiency.

3. Safety and Compliance:

Distinct standards promote clearer compliance and safety protocols, minimizing the risk of confusion or incorrect application of guidelines. First responders rely on precise standards to ensure their safety and operational effectiveness. The consolidation may lead to overlapping or conflicting guidelines, which could inadvertently compromise safety protocols and lead to compliance issues.

Additional Concerns about the Consolidation Process

- Multiple Technical Committees: The consolidation plan necessitates multiple technical committees to meet simultaneously and produce their parts of the standard, complicating coordination and increasing the likelihood of inconsistencies within the standards.

- Meeting Logistics: Scheduling and logistical challenges arise when technical committees for the newly formed standards must convene at the same time, potentially leading to reduced participation and engagement from committee members who may have overlapping responsibilities.

Request for Consideration

Given these concerns, we respectfully request that the NFPA Correlating Committee for NFPA 1985 consider our position and the request made by the Technical Committee for First Responder Respiratory Protection Equipment to keep NFPA 1984 and NFPA 1989 separate. This approach will best serve the interests of first responder safety and operational effectiveness by maintaining the specialization and clarity required for effective respiratory protection in distinct emergency scenarios.

We believe that upholding the distinction between these standards ensures that the guidance remains directly relevant and applicable, thus supporting the highest levels of safety and operational efficiency for first responders.

By addressing these critical issues, we aim to maintain the integrity and effectiveness of the standards that protect our first responders, ensuring that they have the specialized, clear, and actionable guidance necessary to perform their duties safely and efficiently.

NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

M E M O R A N D U M

TO: Technical Committee on Respiratory Protection Equipment

FROM: Yvonne Smith, *Committee Administrator*

DATE: December 11, 2024

SUBJECT: NFPA 1850 Second Draft Technical Committee FINAL Ballot Results (A2025)

According to the final ballot results, all ballot items received the necessary affirmative votes to pass ballot.

45 Members Eligible to Vote
8 Members Not Returned (Childs, Cook, Domitrovich, Johnston, Lynch, Nelson, Pederson, Speier)

The attached report shows the number of affirmative, negative, and abstaining votes as well as the explanation of the vote for **each** revision**.**

To pass ballot, **each** revision requires: (1) a simple majority of those eligible to vote and (2) an affirmative vote of $^{2}/_{3}$ of ballots returned. See Sections 3.3.4.3.(c) and 4.3.10.1 of the ***Regulations Governing the Development of NFPA Standards***.

Second Revision No. 6-NFPA 1850-2024 [Global Comment]

Revise the titles of Chapters 14 through 17 as follows:

14 Respiratory Pr otection Program ~~Component~~ (NFPA 1852)

15 Respiratory Protection Equipment Selection (NFPA 1852)

16 Respiratory Protection Equipment Care (NFPA 1852)

17 Respiratory Protection Equipment Maintenance (NFPA 1852)

Submitter Information Verification

Committee: FAE-RPE
Submittal Date: Tue Aug 13 11:46:03 EDT 2024

Committee Statement

Committee Statement: Specificity is added to the chapter titles to help the user navigate the standard.
Response Message: SR-6-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

45 Eligible Voters
8 Not Returned
33 Affirmative All
3 Affirmative with Comments
0 Negative with Comments
1 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.

Almqvist, Hans O.

Bernzweig, David T.

Blackman, Jason

Butler, Corey

Ciampaglio, Mark

Cross, Chad

Dickson, William

Donnelly, Michelle

Foust, Heidi

Gainey, Robin R.

Kambarian, Erik

Kennedy, Robert T.

Lancaster, Beth C.

Lentz, Kevin D.

Little, Jamie

Mayfield, Lucas

McCarthy, Michael

Mooney, Tom

Morey, Chad A.

Mullin, Kory

Newsom, Amanda H.

Pravetz, Kenneth A.

Profit, Bryan

Sanders, Stephen R.

Sandoval, Maria

Sobocienski, Robert M.

Sooter, Nick

Steedman, Trevor L.

Talaga, Steve

Tekelenburg, Marco

Trudgeon, Mark

Yanagisawa, Albert

Affirmative with Comment

Golla, Ed

Agree

Morris, John H.

A

Smith, Jordan Doyle
- Reasonable Clarification.

Abstention

Cowgill, David E.
won't load

Second Revision No. 16-NFPA 1850-2024 [Detail]

Delete the following text in 14.5.2.1:

(7) NFPA 1987, *Standard on Combination Unit Respirator Systems for Tactical and Technical Operations*, 2023 edition

Submitter Information Verification

Committee: FAE-RPE

Submittal Date: Thu Aug 15 01:43:17 EDT 2024

Committee Statement

Committee Statement: The reference to NFPA 1987 is deleted from the list because NFPA 1850 contains no requirements related to the selection, care, or maintenance of combination unit respirator systems.

Response Message: SR-16-NFPA 1850-2024

Ballot Results

This item has passed ballot

45 Eligible Voters
8 Not Returned
33 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.

Almqvist, Hans O.
Bernzweig, David T.
Blackman, Jason
Butler, Corey
Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Foust, Heidi
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.
Lentz, Kevin D.
Little, Jamie
Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.
Mullin, Kory
Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan
Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick
Steedman, Trevor L.
Talaga, Steve
Tekelenburg, Marco
Trudgeon, Mark
Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.
No requirements in NFPA 1850
Golla, Ed
Agree
Morris, John H.
A
Smith, Jordan Doyle

- Reasonable Modification.

Second Revision No. 3-NFPA 1850-2024 [Section No. 13.1]

14.1 Administration.

14.1.1 Scope.

14.1.1.1*

~~This standard~~ Chapters 14 through 17 shall specify minimum requirements for the selection, care, and maintenance of open-circuit self-contained breathing apparatus (SCBA) ~~and combination SCBA/supplied air respirator (SAR) that are used for respiratory protection during emergency or tactical or technical operations, in environments where the atmosphere is immediately dangerous to life and health (IDLH) or could become oxygen deficient or IDLH~~ certified as compliant with NFPA 1981 or NFPA 1970 (1981) .

14.1.1.2

Chapters 14 through 17 shall specify minimum requirements for the selection, care, and maintenance of respiratory protection equipment for tactical and technical operations certified as compliant with NFPA 1986 .

14.1.1.3

~~This standard~~ Chapters 14 through 17 shall specify the requirements for SCBA models as detailed in 14.1.3.

14.1.1.4

For fire departments, ~~this standard~~ Chapters 14 through 17 shall specify the requirements for the SCBA selection, care, and maintenance component of the respiratory protection program required in Section ~~7.10~~ 9.11 of NFPA ~~1500~~ 1550 .

14.1.1.5

~~This standard~~ Chapters 14 through 17 shall apply to open-circuit SCBA that were certified by an independent third-party certification organization as compliant with the ~~2007, 2013, or 2019 editions of~~ NFPA 1981 ~~, the 2024 edition of~~ NFPA 1970 (1981), ~~or the 2017 or 2023 editions of~~ NFPA 1981 , or NFPA 1986.

14.1.1.6

~~This standard~~ Chapters 14 through 17 shall not specify requirements for other respiratory protection program components of the organization such as SCBA training, appropriate use of SCBA for operations, and breathing air quality as these program components are under the jurisdiction of other NFPA standards.

14.1.1.7

~~This standard~~ Chapters 14 through 17 shall not specify requirements for accessories attached to the SCBA unless specifically addressed herein.

14.1.1.8

Nothing herein shall restrict any jurisdiction from exceeding these minimum requirements.

14.1.2 Purpose.

14.1.2.1

~~The purpose of this standard~~ Chapters 14 through 17 shall ~~be to~~ establish procedures as part of a program to provide care and maintenance for open-circuit SCBA ~~and combination SCBA/SAR in order~~ to reduce the safety risks and potential health risks associated with poorly maintained, contaminated, or damaged SCBA.

14.1.2.2

~~This standard~~ Chapters 14 through 17 shall also establish basic criteria for the evaluation and selection process associated with purchasing open-circuit SCBA to ensure only SCBA that meet the requirements of NFPA 1970 (1981) or NFPA 1986 are acquired for use by emergency services organizations.

14.1.3 Application.

14.1.3.1 New and Existing SCBA.

14.1.3.1.1

For fire departments, ~~this standard~~ Chapters 14 through 17 shall apply to the requirements for selection, care, and maintenance of the SCBA component of the fire department's respiratory protection program as required by Section 9.11 of NFPA 1550 ~~(1500)~~ .

14.1.3.1.2

~~This standard~~ Chapters 14 through 17 shall apply to the acquisition of new open-circuit SCBA and to the preparation of new SCBA to go into the "in service" status.

14.1.3.1.3

~~This standard~~ Chapters 14 through 17 shall apply to the organization's existing open-circuit SCBA that are covered in the care and maintenance part of the respiratory protection program for open-circuit SCBA, and the standard shall also apply to the selection process to acquire new open-circuit SCBA to augment or replace existing SCBA.

14.1.3.1.4

~~This standard~~ Chapters 14 through 17 shall apply to open-circuit SCBA that were certified by an independent third-party certification organization as compliant with ~~the 2007,2013, or 2019 editions of~~ NFPA 1981, ~~with the 2024 edition of~~ NFPA 1970 (1981), or ~~with the 2017 or 2023 editions of~~ NFPA 1986.

14.1.3.2 Implementation.

14.1.3.2.1

When ~~this standard~~ Chapters 14 through 17 ~~is adopted~~ are incorporated by an organization or by a jurisdiction, the authority having jurisdiction shall set a date or dates for achieving compliance with the requirements of this standard.

14.1.3.2.2

The organization or the jurisdiction shall be permitted to establish a phase-in schedule for compliance with specific requirements of ~~this standard~~ Chapters 14 through 17 .

Supplemental Information

File Name	Description	Approved
1850_SR-3_13.1_RPE_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-RPE

Submittal Date: Mon Aug 12 16:52:22 EDT 2024

Committee Statement

Committee Statement: The administrative sections for Chapters 13 through 16 are updated to better reflect the content of these chapters.

Response Message: SR-3-NFPA 1850-2024

Ballot Results

This item has passed ballot

45 Eligible Voters
8 Not Returned
33 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.
Almqvist, Hans O.
Bernzweig, David T.
Blackman, Jason
Butler, Corey
Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Foust, Heidi
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.
Lentz, Kevin D.
Little, Jamie
Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.

Mullin, Kory
Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan
Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick
Steedman, Trevor L.
Talaga, Steve
Tekelenburg, Marco
Trudgeon, Mark
Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.
Defines "this standard" with proper guidance to relevant chapters.
Golla, Ed
Agree
Morris, John H.
14.1.3.1.1 retain NFPA 1550 (1500) as users will recognize NFPA 1500
Smith, Jordan Doyle
- Reasonable Clarification & Accommodations.

Second Revision No. 7-NFPA 1850-2024 [Section No. 13.2.1.2]

14.2.1.2

For fire departments' respiratory protection programs specified in Section 9.11 of NFPA 1550 ~~(1500)~~ , the organization shall develop, implement, and apply the program component for the selection, care, and maintenance of open-circuit SCBA used by the members of the organization in the performance of their assigned functions.

Submitter Information Verification

Committee: FAE-RPE
Submittal Date: Tue Aug 13 12:08:39 EDT 2024

Committee Statement

Committee Statement: The reference to the consolidated standard, NFPA 1550, is updated to remove the parenthetical. This is more consistent with usage in other standards.
Response Message: SR-7-NFPA 1850-2024

Ballot Results

This item has passed ballot

45 Eligible Voters
8 Not Returned
33 Affirmative All
3 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.
Almqvist, Hans O.
Bernzweig, David T.
Blackman, Jason
Butler, Corey
Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Foust, Heidi
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.
Lentz, Kevin D.
Little, Jamie
Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.
Mullin, Kory
Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan
Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick
Steedman, Trevor L.
Talaga, Steve
Tekelenburg, Marco
Trudgeon, Mark
Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.
Alignment with other standards
Golla, Ed
Agree
Smith, Jordan Doyle
- Reasonable Clarification.

Negative with Comment

Morris, John H.

retain NFPA 1550 (1500).

Second Revision No. 1-NFPA 1850-2024 [Section No. 13.4.2]

14.4.2

As part of the respiratory protection program, the organization shall develop SOPs for minimizing exposure to contaminated SCBA.

14.4.2.1

The organization SOP shall include, at a minimum, the following information:

(1) Criteria for determining when SCBA is to be subjected to routine cleaning, disinfecting, and sanitizing; preliminary exposure reduction; advanced cleaning; or specialized cleaning

(2) Procedures for routine cleaning and disinfecting in accordance with Section 16.1 and the manufacturer's instructions

(3) Procedures for preliminary exposure reduction in accordance with Section 16.2 and the manufacturer's instructions

(4) Procedures for advanced cleaning in accordance with Section 16.3 and the manufacturer’s instructions

(5) Procedures for inspection of SCBA after preliminary exposure reduction, advanced cleaning, or specialized cleaning

14.4.2.2

~~As a minimum,~~ Contaminated SCBA that ~~are known to be contaminated or are suspected of being contaminated~~ have not been cleaned shall be both tagged out-of-service and ~~shall be~~ segregated from other equipment, personnel, and civilians.

14.4.2.3

The organization shall define ~~what~~ criteria ~~determine~~ for determining when an SCBA is contaminated beyond the ability to remedy by cleaning ~~and disinfecting in accordance with Section 15.1 of this standard~~ in accordance with Chapter 16 .

14.4.2.3.1

The SOPs shall detail methods for ~~proper~~ disposal of such contaminated SCBA in accordance with 14.8.2.

14.4.2.4

The organization shall develop procedures to minimize the public's risk of exposure to soiled or contaminated SCBA.

Supplemental Information

File Name	Description	Approved
1850_RPE_SR1_13.4.2.docx	staff use	
1850_SR-1_13.4.2_RPE_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-RPE

Submittal Date: Mon Aug 12 12:02:43 EDT 2024

Committee Statement

Committee Statement: Additional clarification is needed to help the user develop a robust SOP related to contamination control. This aligns with user information required in NFPA 1970.

Response Message: SR-1-NFPA 1850-2024

Public Comment No. 3-NFPA 1850-2024 [Section No. 13.4.2]

Ballot Results

✔ **This item has passed ballot**

45 Eligible Voters
8 Not Returned
33 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.
Almqvist, Hans O.
Bernzweig, David T.
Blackman, Jason
Butler, Corey
Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Foust, Heidi
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.

Lentz, Kevin D.
Little, Jamie
Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.
Mullin, Kory
Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan
Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick
Steedman, Trevor L.
Talaga, Steve
Tekelenburg, Marco
Trudgeon, Mark
Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.
This is mostly streamlining clear directions.
Golla, Ed
Agree
Morris, John H.
A
Smith, Jordan Doyle
- Reasonable Clarification.

Second Revision No. 8-NFPA 1850-2024 [Sections 13.5.1.1, 13.5.1.2]

14.5.1.1

SCBA certified to ~~the 2007, 2013, or 2019 editions~~ an earlier edition of NFPA 1981 shall be permitted to be upgraded to a more recent edition of NFPA 1981 or ~~the 2024 edition of~~ NFPA 1970 (1981) using an upgrade kit.

14.5.1.2

SCBA certified to ~~the 2017~~ an earlier edition of NFPA 1986 shall be permitted to be upgraded to ~~the 2023~~ a more recent edition of NFPA 1986 using an upgrade kit.

Submitter Information Verification

Committee: FAE-RPE
Submittal Date: Tue Aug 13 12:12:58 EDT 2024

Committee Statement

Committee Statement: The edition years are eliminated from the text to improve clarity.
Response Message: SR-8-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

45 Eligible Voters
8 Not Returned
32 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
1 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.
Almqvist, Hans O.
Bernzweig, David T.
Blackman, Jason
Butler, Corey
Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.
Lentz, Kevin D.
Little, Jamie
Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.
Mullin, Kory
Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan
Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick
Steedman, Trevor L.
Talaga, Steve
Tekelenburg, Marco
Trudgeon, Mark
Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.
Clarifying language
Golla, Ed
Agree
Morris, John H.
A
Smith, Jordan Doyle

- Reasonable Clarification.

Abstention

Foust, Heidi

14.5.2.1(5) and 14.5.2.1(6) reference NFPA 1986. These types of respirators do not fit in the scope of NFPA 1850 as they are not for the fire service. The retirement of these SCBA may be significantly different than those used in the fire service.

Second Revision No. 17-NFPA 1850-2024 [Section No. 13.5.2]

14.5.2 Retirement.

Detail SR-16

14.5.2.1

SCBA that are currently in service shall be certified as compliant with at least one of the following standards:

(1) NFPA 1981, ~~*Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*~~ , ~~2007 edition~~, as specified in 14.5.2.2.1

(2) NFPA 1981, ~~*Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*~~ , ~~2013 edition~~, as specified in 14.5.2.2 and 14.5.2.3

(3) NFPA 1981, ~~*Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*~~ , ~~2019 edition~~, as specified in 14.5.2.2 and 14.5.2.3

(4) NFPA 1970 (1981), ~~*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)*~~ , ~~2024~~2025 edition, as specified in 14.5.2.2~~13.5.2.3~~ and 14.5.2.3~~13.5.2.4~~

(5) NFPA 1986, ~~*Standard on Respiratory Protection Equipment for Tactical and Technical Operations*~~ , ~~2017 edition.~~

(6) NFPA 1986, ~~*Standard on Respiratory Protection Equipment for Tactical and Technical Operations*~~ , ~~2023 edition~~

~~NFPA 1987, *Standard on Combination Unit Respirator Systems for Tactical and Technical Operations* , 2023 edition~~

14.5.2.2

~~An SCBA certified to the 2007 edition of NFPA 1981 shall be retired within 18 months of the effective date of this standard, unless it has been upgraded to comply with the 2019 edition of NFPA 1981 or the 2024 edition of NFPA 1970 (1981)~~ Except as permitted in 14.5.2.2.1 , SCBA that has not been upgraded by at least two editions of NFPA 1981 or NFPA 1970 (1981) shall be retired 15 years after the year of manufacture .

~~**A.14.5.2.2**~~

~~It is anticipated that retirement of all SCBA manufactured to the 2007 edition NFPA 1981, regardless of upgrade status, will be mandated in the next edition of this standard.~~

~~It is anticipated that retirement of SCBA manufactured to the 2013 edition of NFPA 1981 will begin with the next edition of this standard.~~

14.5.2.2.1

SCBA certified to the 2007 edition of NFPA 1981 shall be permitted to remain in service up to 18 months after the effective date of this standard.

14.5.2.3*

~~If two or more upgrades have not been completed, an SCBA certified to the 2013 or 2019 edition of NFPA 1981 or the 2024 edition of NFPA 1970 (1981) shall be retired after 15 years from the year of manufacture.~~ SCBA that has been upgraded by at least two editions of NFPA 1981 or NFPA 1970 (1981) shall be retired 20 years after the year of manufacture.

A.14.5.2.3

If two or more upgrades have ~~not~~ been completed, an SCBA certified to the 2013 or 2019 edition of NFPA 1981 or the 2025 edition of NFPA 1970 (1981) can be retired after 20 years from the year of manufacture.

~~**13.5.2.4**~~

~~If two or more upgrades have been completed, an SCBA certified to the 2013 or 2019 edition of NFPA 1981 or the 2024 edition of NFPA 1970 (1981) shall be retired after 20 years from the year of manufacture.~~

14.5.2.4

SCBA cylinders shall be retired as specified by 14.8.5.

14.5.2.5

SCBA that have reached the mandatory retirement age shall be retired and disposed of as specified in 14.8.1.

Supplemental Information

File Name	Description	Approved
1850_RPE_SR17_13.5.2.docx	Staff use	
1850_SR-17_13.5.2_RPE_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-RPE
Submittal Date: Thu Aug 15 01:47:39 EDT 2024

Committee Statement

Committee Statement: The text is revised to simplify the requirements from the First Draft by removing the references to specific editions of NFPA 1981 and NFPA 1970 as the basis for requirements. The new text captures the intent to incentivize upgrades to newer editions of NFPA 1981/1970 in order to limit the use of old technology, while still maintaining a maximum life from the date of manufacture.

The exception for SCBA certified to the 2007 edition is included for this edition to allow for a transition period, since these units would have been retired in 2022 under these new rules. It is anticipated that there will be no need to maintain such an exception in future editions.

Response Message: SR-17-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

45 Eligible Voters
8 Not Returned
31 Affirmative All
3 Affirmative with Comments

1 Negative with Comments
2 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.
Almqvist, Hans O.
Blackman, Jason
Butler, Corey
Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.
Lentz, Kevin D.
Little, Jamie
Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.
Mullin, Kory
Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan
Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick

Steedman, Trevor L.

Talaga, Steve

Tekelenburg, Marco

Trudgeon, Mark

Yanagisawa, Albert

Affirmative with Comment

Bernzweig, David T.

A14.5.2.3 appears to be incorrect. This language was inserted when 13.5.2.4 was deleted. The word 'not' should be removed. In addition, the statement 'can be retired after 20 years' is confusing, as it seems to potentially provide an exception to the mandatory retirement requirement in 14.5.2.3. The annex language should be reworded to: If two or more upgrades have been completed, an SCBA certified to the 2013 or 2019 edition of NFPA 1981 or the 2025 edition of NFPA 1970 (1981) can remain in service for up to 20 years from the year of manufacture.

Golla, Ed

Agree

Morris, John H.

Concur with Dave Bernzweig's comment "A14.5.2.3 appears to be incorrect. This language was inserted when 13.5.2.4 was deleted. The word 'not' should be removed. In addition, the statement 'can be retired after 20 years' is confusing, as it seems to potentially provide an exception to the mandatory retirement requirement in 14.5.2.3. The annex language should be reworded to: If two or more upgrades have been completed, an SCBA certified to the 2013 or 2019 edition of NFPA 1981 or the 2025 edition of NFPA 1970 (1981) can remain in service for up to 20 years from the year of manufacture."

Negative with Comment

Smith, Jordan Doyle

- Annex Section A.14.5.2.3: Verbiage " If two or more upgrades have NOT been completed, ... CAN be retired after 20 years from the year of manufacture" appears to circumvent the intent of the 15.5.2 Section requiring the SCBA to be upgraded to remain In Service of (20) years. Recommend simplifying language via TIA to: - 14.5.2 Retirement - 14.5.2.1 + New Proposed Language: “SCBA that are currently in service shall be certified as compliant with at least one of the following standards: (1) NFPA 1981, 2007 edition, as specified in 14.5.2.3.1 (2) NFPA 1981, 2013 edition, as specified in 14.5.2.2 & 15.5.2.3 (3) NFPA 1981, 2019 edition, as specified in 14.5.2.2 & 15.5.2.3 (4) NFPA 1970 (1981), 2025 edition as specified in 14.5.2.2 & 14.5.2.3 (5) NFPA 1986, 2017 edition (6) NFPA 1986, 2023 edition” + Reason: Correct subsection references. - 14.5.2.2 + New Proposed Language: "SCBA certified to NFPA 1970 (1981) shall be retired 15 years after the year of manufacture, except as permitted in 14.5.2.3 & 14.5.2.3.1". + Reason: To set the standards that the service life of an SCBA is 15 years. Specials accommodations to allow for extended service life will be address in 14.5.2.3 & 14.5.2.3.1 independently so they may be modified at a later date if necessary, without verbiage regarding the original 15 year service life being modified. This also allows for 14.5.2.3.1 to be removed in the next edition without effecting the numbering system or a rewrite of 15.5.2.2 by removing the references to specific editions. - 14.5.2.3 + New Proposed Language: "SCBA that have been upgraded to the current, or immediately previous edition of NFPA 1970 (1981) shall be permitted to remain in service and retired 20 years after the year of manufacture". + Reason: Removing requirements dependent on a specified number of upgrades, so that of the intent to keep SCBA upgraded to the most current technology or that compliant with the immediately previous edition of NFPA 1970 (1981) in the event a code standard runs longer than expected and a 2nd upgrade is not available in the 15 year timeframe. - 14.5.2.3.1 + New Proposed Language: “SCBA certified to the 2007 edition of NFPA 1981 shall be permitted to remain in service up to 18 months after the effective date of this standard”. + Reason: Separate the 2007 standard in order that it may be removed from code without affecting numbering system or requiring revision to individual subsection. - 14.5.2.4

SCBA cylinders shall be retired as specified by 14.8.5. - 14.5.2.5 SCBA that have reached the mandatory retirement age shall be retired and disposed of as specified in 14.8.1.

Abstention

Cowgill, David E.

unfamiliar

Foust, Heidi

14.5.1.2 references NFPA 1986. These types of respirators do not fit in the scope of NFPA 1850 as they are not for the fire service.

Second Revision No. 9-NFPA 1850-2024 [Section No. 14.1.2]

15.1.2

The organization shall review the following standards as a minimum:

(1) NFPA 1970(1981 and 1982), *Standard on Protective Ensembles for Structural and Proximity Firefighting, Work Apparel, Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services, and Personal Alert Safety Systems (PASS)*

(2) NFPA 1986, *Standard on Respiratory Protection Equipment for Tactical and Technical Operations*

(3) Chapter 9 of NFPA 1550 ~~(1500)~~ , *Standard for Emergency Responder Health and Safety*

~~**14.1.2.1**~~

~~Fire department organizations shall also review NFPA 1500 and 29 CFR 1910.156.~~

15.1.2.1

Organizations in the United States shall also review 29 CFR 1910.134 and 29 CFR 1910.156 .

15.1.2.2

Organizations outside the United States shall also review all applicable national, state/provincial, and local regulations.

Supplemental Information

File Name	Description	Approved
1850_SR-9_14.1.2_RPE_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-RPE

Submittal Date: Tue Aug 13 12:28:40 EDT 2024

Committee Statement

Committee Statement: The reference to the consolidated standard, NFPA 1550, is updated to remove the parenthetical. This is more consistent with usage in other standards.

The reference to NFPA 1500 in 14.1.2.1 was redundant to the reference to NFPA 1550 in 14.1.2(3). The reference to 29 CFR 1910.156 in 14.1.2.1 is added to the existing requirement in 14.1.2.2 for organizations in the US.

Response Message: SR-9-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

45 Eligible Voters

8 Not Returned
33 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.
Almqvist, Hans O.
Bernzweig, David T.
Blackman, Jason
Butler, Corey
Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Foust, Heidi
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.
Lentz, Kevin D.
Little, Jamie
Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.
Mullin, Kory
Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan

Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick
Steedman, Trevor L.
Talaga, Steve
Tekelenburg, Marco
Trudgeon, Mark
Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.
Remove redundancy
Golla, Ed
Agree
Morris, John H.
A
Smith, Jordan Doyle
- Reasonable Modification.

Second Revision No. 11-NFPA 1850-2024 [Section No. 15.1]

16.1 ~~Routine~~ General Cleaning and Disinfecting.

16.1.1

SCBA and SCBA components shall be cleaned and disinfected when soiled or contaminated.

16.1.2

~~The external surfaces of the~~ SCBA and SCBA components shall be cleaned and disinfected according to the manufacturer's instructions using only those agents indicated by the manufacturer.

16.1.3

The facepiece shall be thoroughly cleaned after each use and disinfected as needed. ~~Facepiece cleaning and disinfecting shall be performed according to the manufacturer's instructions using only those agents indicated by the manufacturer.~~

16.1.3.1

The exhalation valve shall be cleaned and flushed.

16.1.3.2

The facepiece shall be dried~~, and drying shall not be done in~~ away from direct sunlight ~~or in~~ and high heat.

16.1.3.3

The exhalation valve shall be cycled to assure proper operation.

16.1.4

Where the internal components have been exposed to bodily fluids, exhaled breath, dirt, or debris, the second stage regulator shall be thoroughly cleaned and disinfected. ~~The cleaning and disinfecting shall be performed according to the manufacturer's instructions using only those agents indicated by the manufacturer.~~

~~**15.1.5**~~

~~SCBA straps and harness assemblies shall be cleaned and disinfected when required according to manufacturer's instructions. Straps and harness assembly cleaning and disinfecting shall be performed according to the manufacturer's instructions using only those agents indicated by the manufacturer.~~

~~**15.1.5.1***~~

~~Under no circumstances shall a chlorine bleach ever be used to clean straps and harness assemblies.~~

~~**A.15.1.5.1**~~

~~Exposure to chlorine bleach will damage straps and harnesses and cause holes, fraying, fiber fibrillation, and breakage of the strap or harness.~~

16.1.5

The straps and harness assemblies shall be dried~~, and drying shall not be done in~~ away from direct sunlight and ~~or in~~ high heat.

16.1.6

SCBA cylinder valve assemblies shall be cleaned and disinfected ~~according to the manufacturer's instructions using only those agents indicated by the manufacturer~~ .

16.1.6.1

The valve shall be free of debris.

16.1.6.2

The burst disc outlet shall be inspected ~~and, if debris is present, the cylinder shall be removed from service.~~

16.1.6.2.1

~~and, if~~ If debris is present in the burst disc outlet , the cylinder shall be removed from service.

16.1.7*

Water or cleaning materials shall be prevented from entering the connection between the cylinder valve and the mating SCBA inlet connector.

~~**15.1.8**~~

~~Pneumatic component cleaning and disinfecting shall be performed according to the manufacturer's instructions using only those agents indicated by the manufacturer.~~

16.1.8

All pneumatic components, if cleaned, shall be thoroughly dried ~~after cleaning~~ away from direct sunlight and high heat .

~~**15.1.7.2**~~

~~Drying of pneumatic components shall not be done in direct sunlight or in high heat.~~

16.1.9

All other SCBA components shall be thoroughly air-dried prior to storage in a compartment that does not allow for air circulation.

16.1.10

~~Appropriate inspections~~ Inspections shall be performed according to 17.1.2~~shall be performed~~ after cleaning.

16.1.11

~~Where SCBA is suspected of being contaminated~~ If general cleaning and disinfecting does not remove the soil or contamination , ~~it~~ the SCBA shall be tagged out-of-service, ~~and~~ segregated from other equipment and personnel, and subjected to advanced cleaning in accordance with Section 16.3 or specialized cleaning in accordance with Section 16.4 .

16.1.12

Tags shall include details of the incident including known and suspected contaminants.

~~**15.1.13**~~

~~The SCBA manufacturer shall be contacted to determine if any additional special procedures can be used to decontaminate the SCBA.~~

~~**15.1.14**~~

~~In all cases, decontamination shall be conducted in accordance with the SCBA manufacturer's instructions.~~

~~**15.1.15**~~

~~Where it is determined, in accordance with 13.4.2.1 , that the SCBA is contaminated beyond the ability to decontaminate it and return it to service, the SCBA shall be disposed of in accordance with 13.8.2 .~~

Supplemental Information

File Name	Description	Approved
1850_RPE_SR11_15.1.docx	for staff use	
1850_SR-11_15.1_RPE_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-RPE
Submittal Date: Tue Aug 13 14:32:31 EDT 2024

Committee Statement

Committee Statement: This section is revised to align with the addition of advanced and specialized cleaning. The section title was changed from "Routine" to "General" for consistency with the language used in Chapter 7 for general cleaning and disinfecting of protective ensembles and ensemble elements. Redundant requirements to follow manufacturer's instructions were removed. The prohibition of using chlorine bleach for strap and harness assemblies was deleted to allow the manufacturer to specify the allowable cleaning agents, as stated in 5.1.2.

Ballot Results

✔ **This item has passed ballot**

45 Eligible Voters
8 Not Returned
33 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.
Almqvist, Hans O.
Bernzweig, David T.
Blackman, Jason
Butler, Corey

Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Foust, Heidi
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.
Lentz, Kevin D.
Little, Jamie
Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.
Mullin, Kory
Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan
Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick
Steedman, Trevor L.
Talaga, Steve
Tekelenburg, Marco
Trudgeon, Mark
Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.
More concise language.
Golla, Ed
Agree
Morris, John H.
A
Smith, Jordan Doyle
- Reasonable Modification.

Second Revision No. 5-NFPA 1850-2024 [New Section after 15.3]

16.4 Specialized Cleaning.

16.4.1

Organizations shall employ specialized cleaning when contaminants cannot be removed to a safe level by advanced cleaning.

16.4.2*

The specialized cleaning procedure shall be based on one of the following:

(1) Evidence from a documented source showing that the procedure has previously been effective at removing the specific contaminant(s) to a safe level

(2) Evidence from testing the procedure on the contaminated SCBA showing that the procedure is effective at removing the contaminant(s) to a safe level

A.16.4.2

The organization should coordinate and rely on expertise from hazardous materials teams, infectious control specialists, SCBA manufacturers, or other individuals knowledgeable of the type of contamination and effective means of removal.

It might not be possible for a specific cleaning procedure to fully remove all contaminants. In some cases, testing of contaminated SCBA might show residual levels of contamination still being present after cleaning. In these cases, the organization should contact individuals with expertise on exposures and hazards associated with the specific contaminants to determine if there are levels of residual contamination that are acceptable for continued safe use of the SCBA.

It is important that any testing determine baseline levels of certain chemicals or other substances that could be intrinsically part of the SCBA. Typically, certain heavy metals can be found in dyes and other constituents of heavy metals and are not actually due to contamination on the fireground or with the use of the SCBA.

Regardless of any evidence gathered or testing performed to assist in determining whether to apply specialized cleaning, it is highly recommended that organizations maintain records of this information.

16.4.3

Where it is determined that the contaminant(s) cannot be removed to a safe level, the SCBA shall be removed from service in accordance with Section 14.8 .

Submitter Information Verification

Committee: FAE-RPE

Submittal Date: Mon Aug 12 22:59:44 EDT 2024

Committee Statement

Committee Statement: Specialized cleaning is added to provide guidance for situations when advanced cleaning is not effective and non-standard methods are necessary. This section is

consistent with the requirements in Chapter 7 for specialized cleaning of protective ensembles and ensemble elements.

Response Message: SR-5-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

45 Eligible Voters
8 Not Returned
33 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.
Almqvist, Hans O.
Bernzweig, David T.
Blackman, Jason
Butler, Corey
Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Foust, Heidi
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.
Lentz, Kevin D.
Little, Jamie

Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.
Mullin, Kory
Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan
Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick
Steedman, Trevor L.
Talaga, Steve
Tekelenburg, Marco
Trudgeon, Mark
Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.
Better cleaning requirements. Who decides the "SAFE LEVEL"? ..and to what standard?
Golla, Ed
Agree
Morris, John H.
A
Smith, Jordan Doyle
- Reasonable Clarification & Modification.

Second Revision No. 10-NFPA 1850-2024 [Section No. 16.3.5]

17.3.5*

Where filling breathing air cylinders during routine maintenance, all operators and personnel shall be protected from catastrophic failure of the cylinder by the use of an SCBA fill station that meets the requirements specified in Section ~~24.9~~ 23.9 of NFPA ~~1901~~ 1900 .

Submitter Information Verification

Committee: FAE-RPE
Submittal Date: Tue Aug 13 12:33:07 EDT 2024

Committee Statement

Committee Statement: The reference is updated to point to the current edition. NFPA 1901 has been consolidated into NFPA 1900.
Response Message: SR-10-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

45 Eligible Voters
8 Not Returned
33 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.

Almqvist, Hans O.
Bernzweig, David T.
Blackman, Jason
Butler, Corey
Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Foust, Heidi
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.
Lentz, Kevin D.
Little, Jamie
Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.
Mullin, Kory
Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan
Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick
Steedman, Trevor L.
Talaga, Steve
Tekelenburg, Marco
Trudgeon, Mark
Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.
update reference pointer
Golla, Ed
Agree
Morris, John H.
A
Smith, Jordan Doyle

- Reasonable Modification.

Second Revision No. 2-NFPA 1850-2024 [Section No. 16.3.6]

17.4.1.1

SCBA breathing air cylinders shall be requalified as specified by the SCBA manufacturer.

Submitter Information Verification

Committee: FAE-RPE
Submittal Date: Mon Aug 12 15:07:20 EDT 2024

Committee Statement

Committee Statement: The text is moved to the requalification section, which is more appropriate.
Response Message: SR-2-NFPA 1850-2024

Ballot Results

This item has passed ballot

45 Eligible Voters
8 Not Returned
33 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.
Almqvist, Hans O.
Bernzweig, David T.
Blackman, Jason

Butler, Corey
Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Foust, Heidi
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.
Lentz, Kevin D.
Little, Jamie
Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.
Mullin, Kory
Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan
Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick
Steedman, Trevor L.
Talaga, Steve
Tekelenburg, Marco
Trudgeon, Mark
Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.
more appropriate
Golla, Ed
Agree
Morris, John H.
A
Smith, Jordan Doyle
- Reasonable Modification.

Second Revision No. 116-NFPA 1850-2024 [Section No. A.13.4.6]

A.14.4.6

The SCBA manufacturer should be contacted prior to any after-purchase modifications of any sort to an SCBA. Unapproved modifications could affect the NIOSH certification or certification to ~~NFPA 1981~~ NFPA 1970 (1981) or NFPA 1986 and void the certifications.

Submitter Information Verification

Committee: FAE-RPE
Submittal Date: Fri Sep 06 15:57:27 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1981 is updated to the new consolidated standard, NFPA 1970 (1981).

Response Message: SR-116-NFPA 1850-2024

Ballot Results

This item has passed ballot

45 Eligible Voters
8 Not Returned
33 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.

Almqvist, Hans O.

Bernzweig, David T.

Blackman, Jason

Butler, Corey

Ciampaglio, Mark

Cross, Chad

Dickson, William

Donnelly, Michelle

Foust, Heidi

Gainey, Robin R.

Kambarian, Erik

Kennedy, Robert T.

Lancaster, Beth C.

Lentz, Kevin D.

Little, Jamie

Mayfield, Lucas

McCarthy, Michael

Mooney, Tom

Morey, Chad A.

Mullin, Kory

Newsom, Amanda H.

Pravetz, Kenneth A.

Profit, Bryan

Sanders, Stephen R.

Sandoval, Maria

Sobocienski, Robert M.

Sooter, Nick

Steedman, Trevor L.

Talaga, Steve

Tekelenburg, Marco

Trudgeon, Mark

Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.

update reference

Golla, Ed

Agree

Morris, John H.

The SCBA manufacturer should be contacted prior to any after-purchase modifications to an SCBA. suggest remove "of any sort"

Smith, Jordan Doyle

- Reasonable Modification.

Second Revision No. 82-NFPA 1850-2024 [Section No. A.16.3.5]

A.17.3.5

Cylinders should be filled in accordance with the SCBA manufacturers' instructions and NIOSH-approved fill methods for the specific cylinder. Fire departments should also review the requirements in Section ~~7.15~~ 9.15 of NFPA ~~1500~~ 1550 for additional guidance.

Submitter Information Verification

Committee: FAE-RPE

Submittal Date: Sat Aug 17 02:24:48 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1500 is updated to the consolidated NFPA 1550.

Response Message: SR-82-NFPA 1850-2024

Ballot Results

This item has passed ballot

45 Eligible Voters
8 Not Returned
33 Affirmative All
3 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.

Cook, David A.

Domitrovich, Joseph W.

Johnston, Ronald

Lynch, Stephanie

Nelson, Darrin

Pederson, Matthew D.

Speier, Kirk

Affirmative All

Allen, Jason L.

Almqvist, Hans O.

Bernzweig, David T.

Blackman, Jason

Butler, Corey

Ciampaglio, Mark

Cross, Chad

Dickson, William

Donnelly, Michelle

Foust, Heidi

Gainey, Robin R.

Kambarian, Erik

Kennedy, Robert T.

Lancaster, Beth C.

Lentz, Kevin D.

Little, Jamie

Mayfield, Lucas

McCarthy, Michael

Mooney, Tom

Morey, Chad A.

Mullin, Kory

Newsom, Amanda H.

Pravetz, Kenneth A.

Profit, Bryan

Sanders, Stephen R.

Sandoval, Maria

Sobocienski, Robert M.

Sooter, Nick

Steedman, Trevor L.

Talaga, Steve

Tekelenburg, Marco

Trudgeon, Mark

Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.

updated to 1550

Golla, Ed

Agree

Smith, Jordan Doyle

- Reasonable Modification.

Negative with Comment

Morris, John H.

Correct section of NFPA 1550 is "9.16 SCBA Cylinders".

Second Revision No. 117-NFPA 1850-2024 [Section No. C.1.2]

C.1.2

The SCBA cylinder requalification process includes a visual inspection, both internal and external; the hydrostatic test; marking or labeling; and maintenance of proper records of the requalification. Each retest facility has to perform all these functions during a cylinder requalification. Information about the hydrostatic retest is found in 49 CFR ~~173.34(e)~~ Part 180 .

Submitter Information Verification

Committee: FAE-RPE

Submittal Date: Fri Sep 06 16:55:13 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference is updated. The content of Part 173.34 was moved to Part 180 in 2002. (See 67 FR 51626.)

Response Message: SR-117-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

45 Eligible Voters
8 Not Returned
33 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.

Almqvist, Hans O.

Bernzweig, David T.

Blackman, Jason

Butler, Corey

Ciampaglio, Mark

Cross, Chad

Dickson, William

Donnelly, Michelle

Foust, Heidi

Gainey, Robin R.

Kambarian, Erik

Kennedy, Robert T.

Lancaster, Beth C.

Lentz, Kevin D.

Little, Jamie

Mayfield, Lucas

McCarthy, Michael

Mooney, Tom

Morey, Chad A.

Mullin, Kory

Newsom, Amanda H.

Pravetz, Kenneth A.

Profit, Bryan

Sanders, Stephen R.

Sandoval, Maria

Sobocienski, Robert M.

Sooter, Nick

Steedman, Trevor L.

Talaga, Steve

Tekelenburg, Marco

Trudgeon, Mark

Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.

update

Golla, Ed

Agree

Morris, John H.

should we state 49 CFR 180.205? General requirements for requalification of specification cylinders.

Smith, Jordan Doyle

- Reasonable Modification.

Second Revision No. 118-NFPA 1850-2024 [Section No. C.3]

C.3 Frequency Regulatory Agency.

DOT, which is the regulatory authority in the United States, specifies the cylinder requalification frequency. Any agency, cylinder manufacturer, SCBA unit manufacturer, or industry can recommend a more stringent requalification frequency or can recommend a shorter frequency for just the inspection portion of the requalification. The scuba industry, for instance, performs a voluntary annual visual inspection (internal and external) on all-metal scuba cylinders, in addition to the required requalification.

NIOSH and DOT both recommend a different inspection frequency (not requalification) than that required for all-metal SCBA cylinders manufactured by Luxfer USA prior to July 1988. These cylinders were manufactured using 6351 aluminum alloy, and there is a chance for cracking to develop in the neck region (thread region) or crown of the cylinder. Regardless of whether the inspection recommendation is followed or if the cylinder is requalified as required, if the inspection is not properly and diligently performed, the cylinder could be unsafe to fill. This applies to *any* cylinder requalification. The internal and external inspection, hydro testing, marking, and record keeping has to be properly and diligently performed.

Every organization should verify that the retest facility where their SCBA cylinders are requalified is a duly qualified DOT/PHMSA retest facility, holds a valid RIN, and is diligently performing the requalification. If in doubt, contact the DOT for verification that the retest facility is authorized or find a different DOT/PHMSA retest facility. If the organization suspects that the retest facility has not properly or diligently performed the requalification, the DOT Hazardous Materials Enforcement Branch should be contacted ~~at (202) 366-4700~~ .

DOT-authorized composite cylinders have a maximum service life indicated in the special permit (previously known as an exemption). Most special permits specify that composite cylinders have a maximum life of 15 years. The composite cylinder is prohibited from being refilled after 15 years from the original hydrostatic test date.

The service life of all-metal cylinders is determined at the time of requalification. If the cylinder passes the requalification, it can be used until the cylinder shows signs of serious external damage *(see 16.1.2.4 and Annex B)* or until its next requalification.

Submitter Information Verification

Committee: FAE-RPE

Submittal Date: Fri Sep 06 17:02:36 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The telephone number for Hazardous Materials Enforcement is deleted because the PHMSA website indicates that inquiries related to compliance issues should be emailed. Users of the standard should refer to the PHMSA website for updated instructions.

Response Message: SR-118-NFPA 1850-2024

Ballot Results

This item has passed ballot

45 Eligible Voters
8 Not Returned
33 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Childs, Robin B.
Cook, David A.
Domitrovich, Joseph W.
Johnston, Ronald
Lynch, Stephanie
Nelson, Darrin
Pederson, Matthew D.
Speier, Kirk

Affirmative All

Allen, Jason L.
Almqvist, Hans O.
Bernzweig, David T.
Blackman, Jason
Butler, Corey
Ciampaglio, Mark
Cross, Chad
Dickson, William
Donnelly, Michelle
Foust, Heidi
Gainey, Robin R.
Kambarian, Erik
Kennedy, Robert T.
Lancaster, Beth C.
Lentz, Kevin D.
Little, Jamie
Mayfield, Lucas
McCarthy, Michael
Mooney, Tom
Morey, Chad A.
Mullin, Kory

Newsom, Amanda H.
Pravetz, Kenneth A.
Profit, Bryan
Sanders, Stephen R.
Sandoval, Maria
Sobocienski, Robert M.
Sooter, Nick
Steedman, Trevor L.
Talaga, Steve
Tekelenburg, Marco
Trudgeon, Mark
Yanagisawa, Albert

Affirmative with Comment

Cowgill, David E.
go to the web!!
Golla, Ed
Agree
Morris, John H.
A
Smith, Jordan Doyle
- Reasonable Modification.

NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

M E M O R A N D U M

TO: Technical Committee on Structural and Proximity Firefighting Protective Clothing and Equipment

FROM: Yvonne Smith, *Committee Administrator*

DATE: December 11, 2024

SUBJECT: NFPA 1850 Second Draft Technical Committee FINAL Ballot Results (A2025)

According to the final ballot results, all ballot items received the necessary affirmative votes to pass ballot.

33 **Members Eligible to Vote**
6 **Members Not Returned** (Berger, Durby, Eysser, Green, McClintock,Sisson)

The attached report shows the number of affirmative, negative, and abstaining votes as well as the explanation of the vote for **each** revision**.**

To pass ballot, **each** revision requires: (1) a simple majority of those eligible to vote and (2) an affirmative vote of $^{2}/_{3}$ of ballots returned. See Sections 3.3.4.3.(c) and 4.3.10.1 of the ***Regulations Governing the Development of NFPA Standards***.

Second Revision No. 110-NFPA 1850-2024 [Global Comment]

Revise the titles of Chapters 4 through 11 and 13, as follows:

4 Protective Ensembles Selection, Care, and Maintenance Program (NFPA 1851)

5 Protective Ensembles Selection (NFPA 1851)

6 Protective Ensembles Cleaning and Decontamination (NFPA 1851)

7 Protective Ensembles Inspection (NFPA 1851)

8 Protective Ensembles Repair (NFPA 1851)

9 Protective Ensembles Storage (NFPA 1851)

10 Protective Ensembles Retirement, Disposition, and Special Incident Procedure (NFPA 1851)

11 Verification of Organizations and ISPs for Inspection, Cleaning, and Repair of Protective Ensembles (NFPA 1851)

13 Protective Ensembles Test Procedures (NFPA 1851)

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Wed Sep 04 19:11:57 EDT 2024

Committee Statement

Committee Statement: Specificity is added to the chapter titles to help the user navigate the standard.
Response Message: SR-110-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim

Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 123-NFPA 1850-2024 [Global Comment]

[Revise the following sections related to "PPE Technician" in Chapter 5 per the attached Word file.]

Supplemental Information

File Name	Description	Approved
1850_SPF_SR123_Global-Ch5.docx	staff use	
1850_Global_SR-123_SPF_legislative_changes.docx	for prod use	
1850_Global_SR-123_SPF_FINAL.docx	for balloting	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Wed Sep 11 15:12:46 EDT 2024

Committee Statement

Committee Statement: In the First Draft, the committee added text based on a single position for a PPE Technician. It has been divided into two separate positions - Manager and Technician - to separate the responsibilities of overseeing the entire lifecycle of the gear from the task-based work of maintaining the gear. The descriptor "PPE" is changed to "PPC" to clarify that this manager/technician does not maintain other types of PPE, such as respiratory protection equipment. The intended scopes of responsibility and training for these positions will be addressed in definitions and new Annex E. Since the program establishes that the PPC manager oversees the entire program, it is sufficient to refer to the “organization” for most requirements.

These changes are applied in SR-69 (Chapter 4), SR-123 (Chapter 5), SR-124 (Chapter 6), SR-125 (Chapter 7), SR-126 (Chapter 8), SR-127 (9.1.1.1), SR-128 (Chapter 10), and SR-129 (Chapter 11).

Response Message: SR-123-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

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[SR-123]

5.1.1*

Prior to starting the selection process of structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements, the organization~~'s PPE technician(s)~~ shall perform a risk assessment.

5.1.1.1

The organization~~'s PPE technician(s)~~ shall distinguish between the use of structural firefighting ensembles and proximity firefighting ensembles based on the operating area and mission responsibilities of the organization. ~~The risk assessment shall be based on both the frequency and severity of exposure to specific hazards as a means for determining the selection of appropriate firefighting protective ensembles.~~

Commented [JV1]: Note: Text is moving to new sub below.

5.1.1.2

The risk assessment shall be based on both the frequency and severity of exposure to specific hazards as a means for determining the selection of appropriate firefighting protective ensembles.

5.1.1.~~2~~ 3

The organization~~'s PPE technician(s)~~ shall review the risk assessment or conduct a new risk assessment at least every 2 years or under specific circumstances, including, but not limited to, the following:

(1) When there are changes that affect the findings of the current risk assessment in terms of the specific identification of hazards or availability of firefighting protective ensemble product technology

(2) When there are changes in the organization's standard operating procedures (SOPs) for the use of structural firefighting protective ensembles or proximity firefighting protective ensembles

(3) When any personal protective ensemble or ensemble elements are being considered for selection and purchase

5.1.3*

The organization~~'s PPE technician(s)~~ shall review the current editions of NFPA 1970, NFPA 1990, NFPA 1500, NFPA 600, any applicable federal or state OSHA standards, and related international requirements relating to structural firefighting protective ensembles and ensemble elements to determine how they affect the selection process.

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5.1.4*

The organization~~'s PPE technician(s)~~ shall ensure that elements under consideration are certified as being compliant with NFPA 1970 (1971) by a third-party certification organization.

5.1.5*

Based on the risk assessment, the organization~~'s PPE technician(s)~~ shall compile and evaluate information on the comparative strengths and weaknesses of the elements under consideration.

5.1.5.1*

The organization~~'s PPE technician(s)~~, in coordination with its PPE committee, shall specifically consider the tradeoffs in the level of thermal insulation versus thermal comfort or stress-related effects of the material composite in their selection of protective garments.

5.1.6*

The organization~~'s PPE technician(s)~~, in coordination with its PPE committee, shall ensure the proper interface between ensemble elements, including, but not limited to, coat-to-hood and helmet, coat-to-pant, coat-to-glove, and pants-to-footwear. ~~Any other specialty equipment being used shall also be considered to ensure the equipment does not interfere with the proper function and interface of the protective ensemble or ensemble elements.~~

Commented [JV2]: Note: Text is moving to new sub below.

5.1.6.1

~~Any other~~ The use of specialty equipment ~~being used~~ shall ~~also~~ be considered to ensure the equipment does not interfere with the proper function and interface of the protective ensemble or ensemble elements.

5.1.6.~~1~~2*

Based on the risk assessment, the organization~~'s PPE technician(s)~~ shall ensure that eye and face protection components or separate devices are specified to provide adequate eye and face protection for each type of incident identified in the risk assessment.

5.1.7*

Where a field evaluation of an ensemble or ensemble element is conducted, the organization~~'s PPE technician(s)~~, in coordination with its PPE committee, shall establish criteria to ensure a systematic method of comparing products in a manner related to their intended use and assessing their performance relative to the organization's expectations.

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5.1.8*

Where the organization develops purchase specifications, at least the following criteria shall be included:

(1) Purchase specifications shall require that the ensemble or ensemble element(s) to be purchased shall be compliant with the current edition of NFPA 1970. Purchasers shall consider that garments that are certified to the optional liquid and particulate contamination protection requirement are tested and certified and must be worn as stated on the garment label.

(2)* Where the organization selects criteria that exceed the minimum requirements of the current edition of NFPA 1970, such criteria shall be stipulated in the purchase specifications.

(3)* Purchase specifications shall require that submitted offers or bids include substantiation of certification for each element and model offered.

(4)* Where applicable, the purchase specifications shall define the process for determining proper fit.

(5)* The organization, in coordination with its ~~PPE technician(s) and~~ PPE committee, shall compare each bid submittal against purchase specifications.

5.1.9

Upon receipt, the organization~~'s PPE technician(s)~~ shall inspect purchased protective ensemble element(s) to determine that they meet their specifications and that they were not damaged during shipment. ~~The organization's PPE technician(s) shall also verify the quantity and sizes of the protective ensemble element(s) received.~~

Commented [JV3]: Note: Text is moving to new sub below.

5.1.10

The organization~~'s PPE technician(s)~~ shall also verify the quantity and sizes of the protective ensemble element(s) received.

5.1.~~10~~ 11

The organization~~'s PPE technician(s)~~ shall examine information supplied with the products, such as instructions, warranties, and technical data.

5.1.~~11~~ 12

The organization~~'s PPE technician(s)~~ shall establish procedures for returning unsatisfactory products if the organization's specifications are not met.

Second Revision No. 124-NFPA 1850-2024 [Global Comment]

[Revise the following sections related to "PPE Technician" in Chapter 7 per the attached Word file.]

Supplemental Information

File Name	Description	Approved
1850_SPF_SR124_Global-Ch6.docx	staff use	
1850_Global_SR-124_SPF_legislative_changes.docx	for prod use	
1850_Global_SR-124_SPF_FINAL.docx	for balloting	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Wed Sep 11 15:15:16 EDT 2024

Committee Statement

Committee Statement: [NOTE: Chapter 6 and Chapter 7 were swapped by SR-62.]

In the First Draft, the committee added text based on a single position for a PPE Technician. It has been divided into two separate positions - Manager and Technician - to separate the responsibilities of overseeing the entire lifecycle of the gear from the task-based work of maintaining the gear. The descriptor "PPE" is changed to "PPC" to clarify that this manager/technician does not maintain other types of PPE, such as respiratory protection equipment. The intended scopes of responsibility and training for these positions will be addressed in definitions and new Annex E. Since the program establishes that the PPC manager oversees the entire program, it is sufficient to refer to the “organization” for most requirements.

These changes are applied in SR-69 (Chapter 4), SR-123 (Chapter 5), SR-124 (Chapter 6), SR-125 (Chapter 7), SR-126 (Chapter 8), SR-127 (9.1.1.1), SR-128 (Chapter 10), and SR-129 (Chapter 11).

Response Message: SR-124-NFPA 1850-2024

Public Comment No. 64-NFPA 1850-2024 [Sections 6.4.3, 6.4.4, 6.4.5]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments

0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

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[SR-124]

7.1.3*

The organization~~'s PPE technician(s)~~ shall establish guidelines for its members to follow in determining if an element is soiled to an extent that cleaning is necessary.

7.1.4

The organization~~'s PPE technician(s)~~ shall determine appropriate actions to be taken if an element is found to be in need of cleaning or repair.

7.1.4.1

At a minimum, any necessary cleaning shall be ~~done~~ performed in accordance with the requirements specified in Chapter 7. ~~Where a condition exists that is beyond preliminary exposure reduction in accordance with Section 7.2, the element shall be removed from service, tagged, and referred to the organization's PPE technician(s).~~

Commented [JV1]: Note: Text is moving to new sub below.

7.1.4.2

Where a condition exists that is beyond the capabilities of preliminary exposure reduction in accordance with Section 7.2, the element shall be removed from service, tagged, and referred to ~~the organization's PPE technician(s)~~personnel responsible for advanced cleaning.

7.1.4.~~2~~ 3

At a minimum, any necessary repairs shall be ~~made~~ in accordance with the requirements specified in Chapter 8. ~~Where a condition exists that is beyond basic garment element repair in accordance with Section 8.3, the element shall be removed from service, tagged, and referred to the organization's PPE technician(s).~~

Commented [JV2]: Note: Text is moving to new sub below.

7.1.4.4

Where a condition exists that is beyond basic garment element repair in accordance with Section 8.3, the element shall be removed from service, tagged, and referred to ~~the organization's PPE technician(s)~~personnel responsible for repair.

7.1.4.~~3~~ 5

At a minimum, any necessary testing shall be conducted in accordance with the methods specified in Chapter 12.

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7.2.1

The organization~~'s PPE technician~~ shall be responsible for training individual members on how to conduct a routine inspection of their protective ensembles and ensemble elements upon issue, at the beginning of each duty period, and after each use.

7.3.1

Advanced inspection and any necessary testing shall be performed by the ~~organization's PPE technician(s)~~PPC manager, a PPC technician, the element manufacturer, manufacturer-trained organization, a verified organization, or a verified ISP.

7.3.2

The ~~organization's PPE technician(s) who has received training in the advanced inspection of the ensembles or ensemble elements~~PPC manager shall be responsible for performing, managing, or coordinating advanced inspections or the advanced inspection process.

7.3.2.1*

~~A verified training organization, the~~ The ensemble or ensemble element manufacturer or a verified ISP and the organization's PPE technician(s) shall determine the level of training required to perform advanced inspections. ~~The verified training organization, ensemble or ensemble element manufacturer, or verified ISP shall provide written verification of training.~~

Commented [JV3]: Prod: Text is moving to new sub below.

7.3.2.1.1

The ~~verified training organization,~~ ensemble or ensemble element manufacturer~~,~~ or verified ISP shall provide written verification of training.

7.3.2.1.~~1~~ 2

The ~~organization's PPE technician(s)~~ PPC manager shall be trained on advanced inspection procedures by either a verified training organization, an element manufacturer, or a verified ISP upon each new revision of this standard.

7.3.4*

The findings of the advanced inspection shall be documented ~~by the organization's PPE technician(s)~~.

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7.4.1

Complete liner inspection of all garment elements shall be performed by the ~~organization's PPE technician(s)~~PPC manager, a PPC technician, the garment manufacturer, a manufacturer-trained organization, a verified organization, or a verified ISP.

7.4.2

The ~~organization's PPE technician(s) who has received training in the complete liner inspection of the garment element~~PPC manager shall be responsible for performing, managing, or coordinating the complete liner inspection or the complete liner inspection process.

7.4.2.1

~~A verified training organization, the~~ The garment element manufacturer~~,~~ or a verified ISP shall determine the level of training required to perform complete liner inspections. ~~The verified training organization, garment element manufacturer, or verified ISP shall provide written verification of training.~~

Commented [JV4]: Note: Text is moving to new sub below.

7.4.2.1.1

The ~~verified training organization,~~ garment element manufacturer~~,~~ or verified ISP shall provide written verification of training.

7.4.2.1.~~1~~ 2

If the organization is a verified organization, it shall be permitted to determine the level of training necessary to perform the complete liner inspection without any further written verification.

7.4.3

Complete liner inspection of all garment elements shall be conducted ~~by the organization's PPE technician(s)~~ as part of the advanced inspection annually and whenever a routine inspection determines potential damage. The liner system shall be opened to expose all layers for inspection and testing.

7.4.4

The findings of the complete liner inspection shall be documented ~~by the organization's PPE technician(s)~~.

7.4.5.3

The result of each water penetration barrier evaluation shall be recorded ~~by the organization's PPE technician(s)~~.

Second Revision No. 125-NFPA 1850-2024 [Global Comment]

[Revise the following sections related to "PPE Technician" in Chapter 6 per the attached Word file.]

Supplemental Information

File Name	Description	Approved
1850_SPF_SR125_Global-Ch7.docx	staff use	
1850_Global_SR-125_SPF_legislative_changes.docx	for prod use	
1850_Global_SR-125_SPF_FINAL.docx	for balloting	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Wed Sep 11 15:16:27 EDT 2024

Committee Statement

Committee Statement: [NOTE: Chapter 6 and Chapter 7 were swapped by SR-62.]

In the First Draft, the committee added text based on a single position for a PPE Technician. It has been divided into two separate positions - Manager and Technician - to separate the responsibilities of overseeing the entire lifecycle of the gear from the task-based work of maintaining the gear. The descriptor "PPE" is changed to "PPC" to clarify that this manager/technician does not maintain other types of PPE, such as respiratory protection equipment. The intended scopes of responsibility and training for these positions will be addressed in definitions and new Annex E. Since the program establishes that the PPC manager oversees the entire program, it is sufficient to refer to the “organization” for most requirements.

These changes are applied in SR-69 (Chapter 4), SR-123 (Chapter 5), SR-124 (Chapter 6), SR-125 (Chapter 7), SR-126 (Chapter 8), SR-127 (9.1.1.1), SR-128 (Chapter 10), and SR-129 (Chapter 11).

Response Message: SR-125-NFPA 1850-2024

Public Comment No. 70-NFPA 1850-2024 [Sections 7.4, 7.5]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments

0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

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[SR-125]

6.1.1.1*

Cleaning capabilities shall be permitted to be conducted in-house ~~under the direction of the organization's PPE technician(s), or~~ by a manufacturer-trained organization, a verified organization, a verified cleaner, a manufacturer verified in cleaning, a verified ISP, or any combination thereof.

6.1.1.2

The organization~~'s PPE technician(s)~~ shall use the decision tool provided in Figure 6.1.1.2(a) and Figure 6.1.1.2(b) to assist in determining the appropriate cleaning procedures to follow as specified in Sections 6.2 through 6.5.

Figure 6.1.1.2(a) Approach for Deciding Handling, Cleaning, and Disposition of Ensemble Elements.

[no change to figure]

Figure 6.1.1.2(b) Approach for Addressing Specific Types of Contamination.

[no change to figure]

6.1.1.4

The organization~~'s PPE technician(s)~~ shall develop standard operating procedures for field use that reflect the specific decision-making process described in this section and the following additional elements:

(1) Approaches for determining when contamination of firefighters' PPE has occurred

(2) Specific procedures for preliminary exposure reduction, advanced cleaning, sanitization and disinfection, and specialized cleaning for organization PPE

(3) The provision for providing spare gear, loaner gear, or other back-up PPE when PPE is removed from service

6.1.2.1

Ensembles and ensemble elements shall be evaluated by the wearer, the PPC manager, or a PPC technician~~the organization's PPE technician(s)~~ for application of preliminary exposure reduction, cleaning, disinfection, or sanitization after each use based on the guidance provided in Figure 6.1.1.2(a).

6.1.2.1.1

The organization~~'s PPE technician(s)~~ shall develop preliminary exposure reduction procedures and manage the cleaning, retirement, and disposition of the organization's PPE.

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6.1.2.3.1

The information gained from the hazardous materials team, the ~~organization's PPE technician(s)~~PPC manager, or other experts shall be used to determine whether cleaning is possible.

6.1.3* Approach for Addressing Specific Types of Contamination.

Where ensembles and ensemble elements have been suspected or are found to have contamination from bulk chemicals, asbestos, or other designated hazardous substances~~;~~, body fluids~~,~~ or other forms of microbial contamination~~,~~, or products of combustion ~~products from a structural or other fire~~, the organization~~'s PPE technician(s)~~ shall apply the steps shown in Figure 6.1.1.2(b).

6.1.3.1.1

Where the form of contamination cannot be identified, contaminated ensembles and ensemble elements shall be ~~subject~~ subjected to preliminary exposure reduction, isolated, and removed from service ~~by the PPE technician(s)~~ until the suspected contaminant(s) is identified and the elements can receive advanced or specialized cleaning, as necessary, to remove it.

6.1.3.2.2

The type of bulk chemical contamination shall be assessed by the organization's hazardous materials team or other qualified experts, in coordination with the ~~organization's PPE technician(s)~~PPC manager to determine if cleaning or decontamination of the ensembles and ensemble elements is possible.

6.1.3.2.2.1

Where the contaminant and its source have been identified, the organization~~'s PPE technician(s)~~ shall consult the supplier of the contaminant, the manufacturer of the ensemble and ensemble elements, a verified cleaner, or a verified ISP for an appropriate decontamination agent and process.

6.1.3.3.2

The organization's hazardous materials team, or other qualified experts, in coordination with the ~~organization's PPE technician(s)~~PPC manager shall determine if cleaning or decontamination of the ensemble and ensemble elements is possible.

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6.1.3.4.2

The ~~organization's PPE technician(s)~~PPC manager or qualified experts shall determine if disinfection or sanitization and cleaning of the ensemble and ensemble elements is possible.

6.1.3.4.2.3*

The ~~organization's PPE technician(s)~~PPC manager or qualified experts shall determine whether advanced cleaning or specialized cleaning shall be applied in conjunction with disinfection or sanitization.
~~Specialized cleaning shall be permitted to be used in lieu of advanced cleaning, in conjunction with disinfection or sanitization, for those contamination circumstances where advanced cleaning is not considered sufficient to provide appropriate cleaning conditions in conjunction with the procedures used for disinfection or sanitization.~~

Commented [JV1]: Prod: Text is moving to new sub below.

6.1.3.4.2.4

Specialized cleaning shall be permitted to be used in lieu of advanced cleaning, in conjunction with disinfection or sanitization, for those contamination circumstances where advanced cleaning is not considered sufficient to provide appropriate cleaning conditions in conjunction with the procedures used for disinfection or sanitization.

6.3.1

Advanced cleaning shall be performed by the ~~organization's PPE technician(s)~~PPC manager, a PPC technician, an element manufacturer verified in cleaning, a verified cleaner, a manufacturer-trained organization, a verified organization, or a verified ISP.

6.3.1.2

The ~~organization's PPE technician(s)~~PPC manager shall be responsible for performing, managing, or coordinating advanced cleaning or the advanced cleaning process.

6.3.6.1*

Before using any cleaning device other than a washer/extractor or other machine technology indicated in 6.3.5, the organization~~'s PPE technician(s)~~ in collaboration with the element manufacturer, verified cleaner, or verified ISP shall be contacted for instructions on how to best clean the ensemble(s) or ensemble element(s) using the respective cleaning device.

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6.3.18 Additional Requirements for Advanced Cleaning of Garments Certified to the Optional Liquid and Particulate Contaminant Protection Requirements of NFPA 1970.

The organization~~'s PPE technician(s)~~ shall consult the garment manufacturer to determine if any special handling procedures or the removal of interface components or other components must be undertaken prior to advanced cleaning.

6.4.1

~~In collaboration with the organization's PPE technician(s), processes~~ Processes for disinfecting or sanitizing, cleaning, and decontaminating protective ensembles and ensemble elements that have been contaminated with body fluids and other potentially infectious materials shall be performed by a manufacturer verified in cleaning, a verified cleaner, a manufacturer-trained organization, a verified organization, or a verified ISP.

6.5.1

~~In collaboration with the organization's PPE technician(s), specialized~~ Specialized cleaning of protective ensembles and ensemble elements shall be performed by a manufacturer verified in cleaning, a manufacturer-trained organization, a verified organization, a verified cleaner, or a verified ISP.

6.5.4

The organization~~'s PPE technician(s)~~ shall coordinate with and rely on expertise from hazardous materials teams, infection control specialists, verified independent service providers, or other individuals knowledgeable for the type of contaminant and how it can be removed from protective clothing and equipment.

6.5.4.6

Where specialized cleaning is applied for the cleaning of ensembles or ensemble elements involving highly hazardous contaminants, the organization~~'s PPE technician(s)~~ shall give consideration to the disposition of the effluent from the cleaning process and whether disposal into the local sewer system is acceptable according to federal, state, and local regulations.

Second Revision No. 126-NFPA 1850-2024 [Global Comment]

[Revise the following sections related to "PPE Technician" in Chapter 8 per the attached Word file.]

Supplemental Information

File Name	Description	Approved
1850_SPF_SR126_Global-Ch8.docx	staff use	
1850_Global_SR-126_SPF_legislative_changes.docx	for prod use	
1850_Global_SR-126_SPF_FINAL.docx	for balloting	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Wed Sep 11 15:18:33 EDT 2024

Committee Statement

Committee Statement: In the First Draft, the committee added text based on a single position for a PPE Technician. It has been divided into two separate positions - Manager and Technician - to separate the responsibilities of overseeing the entire lifecycle of the gear from the task-based work of maintaining the gear. The descriptor "PPE" is changed to "PPC" to clarify that this manager/technician does not maintain other types of PPE, such as respiratory protection equipment. The intended scopes of responsibility and training for these positions will be addressed in definitions and new Annex E. Since the program establishes that the PPC manager oversees the entire program, it is sufficient to refer to the “organization” for most requirements.

These changes are applied in SR-69 (Chapter 4), SR-123 (Chapter 5), SR-124 (Chapter 6), SR-125 (Chapter 7), SR-126 (Chapter 8), SR-127 (9.1.1.1), SR-128 (Chapter 10), and SR-129 (Chapter 11).

Response Message: SR-126-NFPA 1850-2024

Public Comment No. 71-NFPA 1850-2024 [Sections 8.1, 8.2]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

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[SR-126]

8.1.1

All repairs shall be managed by the ~~organization's PPE technician(s)~~PPC manager and performed by the original manufacturer, a verified ISP, or a member of the organization who has received training.

8.1.3

Ensembles or ensemble elements shall be subjected to advanced cleaning, when necessary, before any repair work is undertaken. ~~Ensembles contaminated by CBRN terrorism agents shall be immediately retired by the organization's PPE technician(s) after CBRN exposure is confirmed and shall not be reused.~~

Commented [JV1]: Note: Text is moving to new sub below.

8.1.3.1

Ensembles contaminated ~~by~~ with CBRN terrorism agents shall be immediately retired ~~by the organization's PPE technician(s)~~ after CBRN exposure is confirmed and shall not be reused.

8.1.5

Due to the different methods of construction, the ensemble or ensemble element manufacturer shall be contacted if the organization~~'s PPE technician(s)~~ or verified ISP is unsure of whether a repair can be accomplished without adversely affecting the integrity of the ensemble or ensemble element.

8.2.3

Repairs of minor tears, char marks, ember burns, and abraded areas shall be limited to those where the damaged area can be covered by a maximum 160 cm^2 (25 $in.^2$) patch of the same material that is compliant with NFPA 1970. ~~In collaboration with the organization's PPE technician(s), for any tears, char marks, ember burns, and abraded areas that require a patch larger than 160 cm^2 (25 $in.^2$), the manufacturer or the verified ISP shall be consulted.~~

Commented [JV2]: Note: Text is moving to new sub below.

8.2.3.1

~~In collaboration with the organization's PPE technician(s), for any tears, char marks, ember burns, and abraded areas that~~ If a damaged area requires a patch larger than 160 cm^2 (25 $in.^2$), the manufacturer or the verified ISP shall be consulted.

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8.2.5

If the complexity of the repair is uncertain, the garment element manufacturer shall be consulted ~~by the organization's PPE technician(s)~~.

8.2.6.5

Where the complexity of the visibility marking repair is uncertain, the garment element manufacturer shall be consulted ~~by the organization's PPE technician(s)~~.

8.3 Additional Requirements for Basic Garment Element Repair.

The repairs specified in this section shall be managed by the ~~organization's PPE technician(s)~~PPC manager and performed by the PPC manager, a PPC technician, the element manufacturer, ~~the organization's trained individual(s),~~ manufacturer-trained organizations, verified organizations, or verified ISPs. ~~Basic repairs shall be limited to the following:~~

~~(1) Patching of minor tears, char marks, and ember burns to a separable outer shell~~

~~(2) Repairing of skipped, broken, and missing stitches to a separable outer shell~~

~~(3) Replacement of missing hardware, excluding positive closure systems to a separable outer shell~~

~~(4) Reclosing of the liner of a garment after inspection~~

Commented [JV3]: Note: Text is moving to new sub below.

8.3.1

Basic repairs shall be limited to the following:

(1) Patching of minor tears, char marks, and ember burns to a separable outer shell

(2) Repairing of skipped, broken, and missing stitches to a separable outer shell

(3) Replacement of missing hardware, excluding positive closure systems to a separable outer shell

(4) Reclosing of the liner of a garment after inspection

8.4.1*

The repairs specified in this section shall be managed by the ~~organization's PPE technician(s)~~PPC manager and conducted only by the element manufacturer, a verified organization, or a verified ISP meeting the requirements as specified in Chapter 11.

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8.4.2

Repairs to the garment outer shell shall be performed consistent with the garment element manufacturer's methods. ~~The garment element manufacturer shall be contacted if the organization's PPE technician(s) is unsure of the complexity of the repair.~~

8.4.2.1

The garment element manufacturer shall be contacted if the ~~organization's PPE technician(s)~~PPC manager is unsure of the complexity of the repair.

8.4.3*

All repairs to the garment moisture barrier shall be performed consistent with the moisture barrier manufacturer's methods. ~~The original garment element manufacturer shall be contacted if the organization's PPE technician(s) is unsure as to whether an area to be repaired contains a moisture barrier.~~

8.4.3.1

The ~~original~~ garment element manufacturer shall be contacted if the ~~organization's PPE technician(s)~~PPC manager is unsure as to whether an area to be repaired contains a moisture barrier.

8.4.6

Restitching of more than 25 mm (1 in.) continuous ~~(1 in. continuous)~~ of a Major A seam shall require the ~~organization's PPE technician~~PPC manager to consult with the garment element manufacturer ~~and restitching shall be conducted in a manner consistent with the garment element manufacturer's methods~~.

8.4.6.1

~~restitching~~ Restitching shall be conducted in a manner consistent with the garment element manufacturer's methods.

8.4.7

Repairs to Major B seams in the moisture barrier shall require consulting the garment element manufacturer ~~and shall be conducted in a manner consistent with the barrier manufacturer's recommendations~~.

8.4.7.1

Repairs to Major B seams in the moisture barrier shall be conducted in a manner consistent with the barrier manufacturer's recommendations.

Commented [JV4]: Note: Text is moving to new sub below.

Commented [JV5]: Note: Text is moving to new sub below.

Commented [JV6]: Note: Text is moving to new sub below.

Commented [JV7]: Note: Text is moving to new sub below.

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8.4.7.~~1~~ 2

Repairs to Major B seams in the thermal liner that do not affect any moisture barrier material shall be permitted. ~~Restitching of more than 25 mm continuous (1 in. continuous) of any Major B seams shall require the organization's PPE technician(s) to consult with the garment element manufacturer and repairs shall be conducted in a manner consistent with the garment element manufacturer's methods.~~

8.4.7.3

Restitching of more than 25 mm (1 in.) continuous ~~(1 in. continuous)~~ of any Major B seams shall require the ~~organization's PPE technician(s)~~PPC manager to consult with the garment element manufacturer.

8.4.7.4

~~repairs~~ Repairs shall be conducted in a manner consistent with the garment element manufacturer's methods.

8.4.10*

Replacement zippers shall be installed in a manner consistent with the garment element manufacturer's method of construction. ~~If the organization's PPE technician(s) is uncertain of the complexity of the repair, the garment element manufacturer shall be consulted.~~

8.4.10.1

If the ~~organization's PPE technician(s)~~PPC manager is uncertain of the complexity of the repair, the garment element manufacturer shall be consulted.

8.4.11*

Replacement hook-and-loop fastener tape shall be installed in a manner consistent with the garment element manufacturer's method of construction. ~~If the organization's PPE technician is uncertain of the complexity of the repair, the garment element manufacturer shall be consulted.~~

8.4.11.1

If the ~~organization's PPE technician~~PPC manager is uncertain of the complexity of the repair, the garment element manufacturer shall be consulted.

8.5.2*

Where there is an indication of a crack, dent, abrasion, bubbling, soft spot, discoloration, or warping in the helmet shell, the helmet element manufacturer shall be contacted ~~by the organization's PPE technician(s)~~ to determine serviceability.

Commented [JV8]: Note: Text is moving to new subs below.

Commented [JV9]: Note: Text is moving to new sub below.

Commented [JV10]: Note: Text is moving to new sub below.

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8.7.2

Other than for the replacement of bootlaces and zipper assemblies, the ~~organization's PPE technician(s)~~PPC manager shall contact the footwear manufacturer to determine feasibility of the repair.

8.9 Additional Requirements for Structural Firefighting Ensembles and Proximity Firefighting Garments with Optional Liquid and Particulate Contaminant Protection.

In addition to the requirements in Section 8.1, all repairs to garments with optional liquid and particulate contaminant protection shall be referred ~~by the organization's PPE technician(s)~~ to the garment manufacturer.

Second Revision No. 128-NFPA 1850-2024 [Global Comment]

[Revise the following sections related to "PPE Technician" in Chapter 10 per the attached Word file.]

Supplemental Information

File Name	Description	Approved
1850_SPF_SR128_Global-Ch10.docx	staff use	
1850_Global_SR-128_SPF_legislative_changes.docx	for prod use	
1850_Global_SR-128_SPF_FINAL.docx	for balloting	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Wed Sep 11 15:21:37 EDT 2024

Committee Statement

Committee Statement: In the First Draft, the committee added text based on a single position for a PPE Technician. It has been divided into two separate positions - Manager and Technician - to separate the responsibilities of overseeing the entire lifecycle of the gear from the task-based work of maintaining the gear. The descriptor "PPE" is changed to "PPC" to clarify that this manager/technician does not maintain other types of PPE, such as respiratory protection equipment. The intended scopes of responsibility and training for these positions will be addressed in definitions and new Annex E. Since the program establishes that the PPC manager oversees the entire program, it is sufficient to refer to the “organization” for most requirements.

These changes are applied in SR-69 (Chapter 4), SR-123 (Chapter 5), SR-124 (Chapter 6), SR-125 (Chapter 7), SR-126 (Chapter 8), SR-127 (9.1.1.1), SR-128 (Chapter 10), and SR-129 (Chapter 11).

Response Message: SR-128-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

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[SR-128]

10.1.1*

The organization~~'s PPE technician(s)~~ shall develop specific criteria for removal of structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements from service~~, which includes, but is not limited to, issues that are specific to the ensembles or ensemble elements being used by the organization, the manufacturer's instructions, and the experience of the organization~~.

Commented [JV1]: Note: Text is moving to new sub below.

10.1.1.1

Criteria for removal shall include, but not be limited to, issues that are specific to the ensembles or ensemble elements being used by the organization, the manufacturer's instructions, and the experience of the organization.

10.1.4*

Structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements that are worn or damaged to the extent that the organization~~'s PPE technician(s)~~ deems it not possible or cost effective to repair shall be retired in accordance with 10.2.1.

10.1.6

Structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements that are contaminated to the extent that the organization~~'s PPE technician(s)~~ deems it not possible or cost effective to clean ~~them~~ shall be retired in accordance with 10.2.1.

10.1.8*

Structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements that are no longer of use to the organization for emergency operations service~~, as determined by the PPE technician(s),~~ but are not contaminated, defective, or damaged shall be retired in accordance with 10.2.1 or 10.2.2.

10.2.2

Retired structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements determined to be no longer of use in accordance with 10.1.8 shall be permitted to be used as follows:

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(1) For training that does not involve live fire, provided the ensembles and ensemble elements are appropriately marked as being for non-live-fire training only

(2) As determined by the organization~~'s PPE technician(s)~~

10.3.1*

The ~~organization's PPE technician(s)~~PPC manager shall develop and carry out the procedures for the handling and custody of structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements that were worn by firefighters who were victims at incidents where serious injuries or fatalities to the firefighters occurred.

10.3.2

In the absence of any other prevailing rules of evidence, the organization~~'s PPE technician(s)~~ shall ~~see the following procedures are implemented. They shall include, but not be limited to, the following~~implement the following procedures:

(1) Provisions shall be made for the immediate removal from service and preservation of all structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements utilized by the injured or deceased firefighter.

(2) Custody of such ensembles and ensemble elements shall be maintained at a secure location with controlled, documented access.

(3) All such structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements shall be nondestructively tagged and stored only in paper or cardboard containers to prevent further degradation or damage. Plastic or airtight containers shall not be used.

(4) Examination of the structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements shall be made by the ~~organization's PPE technician(s)~~ PPC manager, with the help of outside experts if needed, to determine the condition thereof.

10.3.3

The organization~~, under the direction of the PPE technician(s),~~ shall determine a specific period of time for retaining custody of structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements.

Second Revision No. 129-NFPA 1850-2024 [Global Comment]

[Revise the following sections related to "PPE Technician" in Chapter 11 per the attached Word file.]

Supplemental Information

File Name	Description	Approved
1850_SPF_SR129_Global-Ch11.docx	staff use	
1850_Global_SR-129_SPF_legislative_changes.docx	for prod use	
1850_Global_SR-129_SPF_FINAL.docx	for balloting	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Wed Sep 11 15:22:32 EDT 2024

Committee Statement

Committee Statement: In the First Draft, the committee added text based on a single position for a PPE Technician. It has been divided into two separate positions - Manager and Technician - to separate the responsibilities of overseeing the entire lifecycle of the gear from the task-based work of maintaining the gear. The descriptor "PPE" is changed to "PPC" to clarify that this manager/technician does not maintain other types of PPE, such as respiratory protection equipment. The intended scopes of responsibility and training for these positions will be addressed in definitions and new Annex E. Since the program establishes that the PPC manager oversees the entire program, it is sufficient to refer to the “organization” for most requirements.

These changes are applied in SR-69 (Chapter 4), SR-123 (Chapter 5), SR-124 (Chapter 6), SR-125 (Chapter 7), SR-126 (Chapter 8), SR-127 (9.1.1.1), SR-128 (Chapter 10), and SR-129 (Chapter 11).

Response Message: SR-129-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

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Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

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[SR-129]

11.3.11

The organization~~'s PPE technician(s)~~ or the ISP shall maintain all inspection and test data from the certification organization used in the verification of the organization's or the ISP's services. ~~The organization's PPE technician(s) or ISP shall provide such data, upon request, to the purchaser or authority having jurisdiction.~~

Commented [JV1]: Note: Text is moving to new sub below.

11.3.11.1

The organization~~'s PPE technician(s)~~ or ISP shall provide such data, upon request, to the purchaser or authority having jurisdiction.

11.4.1

The organization~~'s PPE technician(s)~~ or the ISP's management shall define and document its policy and objectives for, and commitment to, quality and shall ensure that this policy is understood, implemented, and maintained at all levels in the organization or the ISP.

11.4.2

The organization~~'s PPE technician(s)~~ or the ISP shall operate an effective quality system appropriate to the type, range, and volume of work performed.

11.4.3

The management of the organization~~'s PPE technician(s)~~ or the ISP's designee, irrespective of other duties, shall have defined authority and responsibility for quality assurance within the organization or ISP. ~~The quality system shall be maintained relevant and current under the responsibility of the same person.~~

Commented [JV2]: Note: Text is moving to new sub below.

11.4.3.1

The quality system shall be maintained relevant and current under the responsibility of the same person.

11.4.5

The organization~~'s PPE technician(s)~~ or ISP shall maintain a system for control of all documentation relating to its activities ~~and shall ensure the following:~~

~~(1) That the current revisions of the appropriate documentation are available at all relevant locations and to all relevant staff~~

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~~(2) That all amendments to documents are authorized and processed in a manner that will ensure timely availability at the appropriate location~~

~~(3) That superseded documents are removed from use throughout the organization but that one copy is filed for a determined period~~

~~(4) That other parties, as necessary, are notified of changes~~

Commented [JV3]: Note: List items are moving to new subs below.

11.4.5.1

The current revisions of the appropriate documentation shall be~~are~~ available at all relevant locations and to all relevant staff.

11.4.5.2

All amendments to documents ~~are~~ shall be authorized and processed in a manner that will ensure timely availability at the appropriate location.

11.4.5.3

Superseded documents ~~are~~ shall be removed from use throughout the organization, except for ~~but that~~ one copy that is filed for a determined period.

11.4.5.4

Other parties, as necessary, ~~are~~ shall be notified of changes.

11.4.6

The organization~~'s PPE technician(s)~~ or the ISP shall carry out a system of planned and documented internal quality audits to verify compliance with the criteria of this standard and the effectiveness of the quality system. ~~The personnel performing the audits shall be suitably qualified and independent from the functions being audited.~~

Commented [JV4]: Prod: Text is moving to new sub below.

11.4.6.1

The personnel performing the audits shall be suitably qualified and independent from the functions being audited.

11.4.7

The organization~~'s PPE technician(s)~~ or the ISP shall have documented procedures for dealing with feedback and corrective action whenever discrepancies are detected in the quality system or in the performance of inspections.

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11.4.8

The ~~management of the organization's PPE technician(s)~~PPC manager or the ISP shall review the quality system at least annually to ensure its continuing suitability and effectiveness. ~~The results of such reviews shall be recorded.~~

Commented [JV5]: Prod: Text is moving to new sub below.

11.4.8.1

The results of such reviews shall be recorded.

Second Revision No. 14-NFPA 1850-2024 [Global Comment]

[See attached for new Annex E]

Supplemental Information

File Name	Description	Approved
1850_Global_SR-14_Annex_E_SPF_NEW.docx	for editorial only	
1850_Global_SR-14_SPF_FINAL.pdf	for balloting	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Aug 14 17:58:57 EDT 2024

Committee Statement

Committee Statement: This new annex provides a single location to clearly describe the intended responsibilities for the defined roles of a PPC Manager and a PPC Technician. It also describes a proposed training curriculum that would allow the individuals to meet these responsibilities to help organizations establish these roles in the absence of a professional qualifications standard.

Response Message: SR-14-NFPA 1850-2024

Public Comment No. 53-NFPA 1850-2024 [Global Input]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

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McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

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Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

ok

Stull, Jeffrey O.

Agree

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[SR-14]

Annex E PPC Manager and PPC Technician (NFPA 1851)

E.1 PPC Management Program.

The organization should establish a personal protective clothing (PPC) program, managed by a PPC manager. Tasks associated with the care, inspection, and maintenance of PPC can also be assigned to a PPC technician or authorized designee.

E.2 PPC Manager.

A PPC manager is a managerial role within an organization, who is responsible for overseeing the entire lifecycle of firefighter PPC.

While following all the requirements of this standard, the functions of the PPC manager include, but are not limited to, the following:

(1) Maintaining an understanding of current NFPA Standards (e.g., NFPA 1970) as well as other required standards and laws (e.g., OSHA) for the purchase of appropriate PPC.

(2) Reviewing the organization's operations to complete a risk assessment for the type of PPC required.

(3) Establishing and periodically reviewing policies and procedures for the proper use and care of PPC within the organization.

(4) Establishing a system to monitor, track, and document PPC over its life.

(5) Determining the useful life of PPC but not to exceed the retirement requirements of this standard.

(6) Establishing criteria for assessing PPC selection.

(7) Actively participating in the selection of the organization's PPC.

(8) Establishing processes for returning product that does not meet specifications.

(9) Following retirement and disposal criteria of PPC.

(10) Establishing procedures for the cleaning, inspection, and maintenance of PPC.

(11) Managing, coordinating, and approving repairs of PPC.

(12) Establishing a process for the fitting of PPC for firefighters.

(13) Developing a training program specific for the job functions of the PPC technician(s), if assigned.

(14) Developing and implementing a training program for the entire organization detailing the proper fit, function, limitations, and handling of PPC as well as the expected inspection and cleaning of PPC. The PPC manager could train and assign the PPC technician (or other individual) to deliver the training.

(15) Participating in the budgeting process and strategic planning related to PPC acquisition and maintenance.

(16) Establishing exposure procedures and controls for the handling of contaminated PPC sent for cleaning, inspection, or maintenance.

(17) Representing, or assigning a designee to represent, the organization as the primary point of contact with the element manufacturer or verified ISP for matters pertaining to the PPC maintenance and repairs.

E.3 PPC Technician.

The PPC technician(s) is an individual(s) who is assigned and has received specialized training for the care and maintenance of the department's PPC. The technician ensures that all PPC is in proper working condition and compliant with relevant standards, such as NFPA 1970 and this standard.

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The PPC technician(s) role can be performed by the PPC manager, another employee of the organization, verified organization, verified ISP, or a combination thereof.

While following all the requirements of this standard, the functions of the PPC technician can include, but are not limited to, the following:

(1) Examining and filing information provided with PPC.

(2) If designated by the PPC manager, establishing the schedule for cleaning, inspecting, and maintaining PPC.

(3) Determining the need for repair or specialized cleaning (example: bloodborne pathogen).

(4) Performing advanced inspections on all ensemble elements to determine serviceability.

(5) Coordinating all repairs, including the following:

(a) If properly trained, performing basic element repair. (Advanced repair can be performed by a verified organization.)

(b) If designated by the PPC manager, consulting with the element manufacturer or verified ISP on advanced ensemble element repair.

(6) Documenting PPC care and maintenance activities.

(7) Evaluating the assigned procedures in an on-going manner and reporting concerns and improvements to the PPC manager, including any safety and health concerns related to working with contaminated PPC.

E.4 Training and Curriculum.

The following outline is provided to illustrate everything that should be included in the PPC training program:

(1) Introduction to firefighter PPC

(a) Definition of PPC

(b) Importance of PPC in firefighting

(c) Evolution of firefighter PPC

(d) Limitations of firefighter PPC

(2) NFPA and OSHA regulations

(a) Overview of NFPA standards

(b) Occupational Safety and Health Administration (OSHA) regulations related to PPC

(c) Compliance requirements for firefighter PPC

(3) Selection of firefighter PPC

(a) Understanding different types of PPC

(b) Factors influencing PPC selection (e.g., hazards, comfort, fit)

(c) Evaluating PPC for compliance with NFPA standards

(4) Care and maintenance of firefighter PPC

(a) Importance of proper care and maintenance

(b) Inspection procedures for PPC

(c) Handling and storage guidelines

(d) Record-keeping requirements

(5) Cleaning of firefighter PPC

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(1) Importance of cleaning PPC

(2) Cleaning methods for different types of PPC (e.g., turnout gear, helmets, boots)

(3) Recommended cleaning agents and techniques

(4) Drying procedures

(6) Repairs of firefighter PPC

(a) Identifying damage and wear

(b) Repair vs. replacement considerations

(c) Basic repair techniques for PPC components (e.g., stitching, patching)

(d) Guidelines for outsourcing repairs to certified professionals

(7) Practical training and exercises

(a) Hands-on inspection and maintenance demonstrations

(b) Simulated cleaning and repair exercises

(c) Role-playing scenarios to reinforce learning

(8) Conclusion

(a) Recap of key points covered

(b) Importance of ongoing training and education

(c) Resources for further information and support

This outline is meant to provide a comprehensive framework for establishing a PPC training program. Each section could be expanded into detailed modules with relevant content, activities, and assessments.

Second Revision No. 65-NFPA 1850-2024 [Global Comment]

Delete Sections 11.7 and 11.8 and create a new Chapter 12, as follows:

Chapter 12 Certification of Advanced Cleaning Products and Equipment for Protective Ensembles (NFPA 1851)

12.1 Certification of Cleaning Equipment and Processes Used for Advanced Cleaning and Sanitization for Garments. (Reserved)

12.2 Certification of Detergents and Cleaning/Decontamination Products for PER, Advanced Cleaning, and Sanitization. (Reserved)

Supplemental Information

File Name	Description	Approved
1850_Global_SR-65_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 23:04:30 EDT 2024

Committee Statement

Committee Statement: Sections 11.7 and 11.8 are deleted because these requirements lack a sufficient program to certify products and equipment. The headings are being moved to a new Chapter 12 because certification is a conformity assessment program that is separate from verification. These reserved sections will serve as placeholders for future requirements.

Response Message: SR-65-NFPA 1850-2024

Public Comment No. 40-NFPA 1850-2024 [Sections 11.7, 11.8]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
3 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Stull, Jeffrey O.
Agree

Negative with Comment

Reidy, Jim

There has been a wide range of claims for products and their effectiveness when used in PER. Self reported effectiveness should be proven and validated before these claims are allowed.

Second Revision No. 69-NFPA 1850-2024 [Global Comment]

[Revise the following sections related to "PPE Technician" in Chapter 4 per the attached Word file.]

Supplemental Information

File Name	Description	Approved
1850_SPF_SR69_Global-Ch4.docx	staff use	
1850_Global_SR-69_SPF_legislative_changes.docx	for prod use	
1850_Global_SR-69_SPF_FINAL.docx	for balloting	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Sat Aug 17 00:20:19 EDT 2024

Committee Statement

Committee Statement: In the First Draft, the committee added text based on a single position for a PPE Technician. It has been divided into two separate positions - Manager and Technician - to separate the responsibilities of overseeing the entire lifecycle of the gear from the task-based work of maintaining the gear. The descriptor "PPE" is changed to "PPC" to clarify that this manager/technician does not maintain other types of PPE, such as respiratory protection equipment. The intended scopes of responsibility and training for these positions will be addressed in definitions and new Annex E. Since the program establishes that the PPC manager oversees the entire program, it is sufficient to refer to the “organization” for most requirements.

These changes are applied in SR-69 (Chapter 4), SR-123 (Chapter 5), SR-124 (Chapter 6), SR-125 (Chapter 7), SR-126 (Chapter 8), SR-127 (9.1.1.1), SR-128 (Chapter 10), and SR-129 (Chapter 11).

Response Message: SR-69-NFPA 1850-2024

Public Comment No. 77-NFPA 1850-2024 [Section No. 4.3.4]

Public Comment No. 47-NFPA 1850-2024 [Global Input]

Public Comment No. 52-NFPA 1850-2024 [Section No. A.4.2.2.1]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
3 Affirmative with Comments

0 Negative with Comments
1 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
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Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
Reidy, Jim

x

Stull, Jeffrey O.

Agree

Abstention

McMillan, Neil

70% cleaning efficacy is achievable by ISPs and departments. Currently there is no ISP who sought ISP cleaning verification who has not received it, because a 50% cleaning efficacy requirement is too low. Little meaning comes from a cleaning validation, if there are no applicants who have been unable to achieve certification. It is also recognized that the phthalates added to the contamination removal testing artificially skews the figures upwards, further necessitating the requirement for an increase from 50% cleaning, to achieve a meaningful certification.

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[SR-69]

~~**4.2.2.1***~~

~~Organizations shall develop a job description for a PPE technician.~~

~~**A.4.2.2.1**~~

~~This job description should include, but not be limited to, educational criteria for the organization's members related to selection, use inspection, cleaning, drying, storage, retirement, and disposal for all elements of the ensemble.~~

4.3.2*

The organization~~'s PPE technician(s),~~ shall develop written standard operating procedures (SOPs) that shall identify and define the various parts of the program and the various roles and responsibilities of the organization and of the members in the program parts specified in Table 4.3.2.

Table 4.3.2 Required Program Parts for Structural and Proximity Firefighting Protective Ensembles and Elements

4.3.3.2*

In the event that the organization~~'s PPE technician(s)~~ cannot make contact with the ensemble or ensemble element manufacturer for a specific accessory to be used on the ensemble or ensemble element, the organization~~'s PPE technician(s)~~ shall be permitted to evaluate the accessory for attachment to an ensemble or ensemble element using recognized tests to determine that the accessory does not degrade the performance of the ensemble or ensemble element.

4.3.3.3*

In the event the organization's ~~PPE technician(s)'~~ written requests for permission have not received a reply from the ensemble or ensemble element manufacturer for a specific accessory to be used on the ensemble or ensemble element, the organization~~'s PPE technician(s)~~ shall be permitted to evaluate the accessory for attachment to an ensemble or ensemble element using recognized tests to determine that the accessory does not degrade the performance of the ensemble or ensemble element.

4.3.4*

The organization~~'s PPE technician(s)~~ shall ensure one or any combination thereof of the following to perform advanced cleaning, sanitization or disinfection, advanced inspection, and repair services of ensembles and ensemble elements *(see Table 4.3.4)*:

~~(1) Verified training organization~~

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(~~2~~1) Manufacturer verified in cleaning

(~~3~~2) Verified organization

(~~4~~3) Verified independent service provider (ISP)

(~~5~~4) Verified cleaner

(~~6~~5) Manufacturer-trained organization for the organization's ensembles and ensembles elements only

(~~7~~6) Ensemble or ensemble element manufacturer

Table 4.3.4 Responsibilities for Garment Element Inspection, Cleaning, and Repair

[delete the columns for "PPE Technician Overall Responsibilities" and "Verified Training Organization Knowledge & Skills Training Only"]

	~~PPE Technician Overall Responsibilities~~	~~Verified Training Organization Knowledge & Skills Training Only~~	**Manufacturer Verified in Cleaning**	**Verified ISP or Verified Organization**	**Verified Cleaner**	**Manufacturer-Trained Organization**	**User**	**Ensemble or Ensemble Element Manufacturer**
Routine inspections (Section 6.2)	~~X~~	~~X~~					X	
Preliminary exposure reduction (Section 7.2)	~~X~~	~~X~~					X	
Advanced inspection (Section 6.3)	~~X~~	~~X~~	X	X		X		X
Complete liner inspection (Section 6.4)	~~X~~	~~X~~	X	X		X		X
Advanced cleaning (Section 7.3)	~~X~~	~~X~~	X	X	X	X		

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	~~PPE Technician Overall Responsibilities~~	~~Verified Training Organization Knowledge & Skills Training Only~~	Manufacturer Verified in Cleaning	Verified ISP or Verified Organization	Verified Cleaner	Manufacturer-Trained Organization	User	Ensemble or Ensemble Element Manufacturer
Sanitization or disinfection (Section 7.4)	~~X~~	~~X~~	X	X	X	X		
Specialized cleaning (Section 7.5)	~~X~~	~~X~~	X	X	X	X		
Repair management	~~X~~							
Basic repair (Sections 8.2 and 8.3)			X	X		X		X
Advanced repair (Sections 8.2 and 8.4)			X	X				X
Training for cleaning	~~X~~	~~X~~	X	X	X			X
Training for repairs			X	X				X
Training for the management of repairs	~~X~~							
Training for inspection	~~X~~	~~X~~	X	X				X
Training for record keeping (Section 4.4)	~~X~~	~~X~~						

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A.4.3.4

~~This should not be limited solely to manufacturer-based training if a verified training organization has the proven capability to perform the training requirements in this standard. The PPE technician(s) should be responsible for all facets of PPE program management. The PPE technician(s) can perform these responsibilities or be responsible to see that these duties are performed in accordance with the requirements of this standard.~~

A manufacturer-trained organization receives training from an element manufacturer or a verified ISP in cleaning, inspection, and repair services for that organization's own elements. For garment elements, this entity has not received any formal verification from a third-party certification organization. If an organization has received training in cleaning, inspection, and repair of elements, it can be permitted to utilize another organization's equipment to conduct cleaning, inspection, or repair. For example, if organization A purchases a washer/extractor and neighboring organization B wishes to utilize this washer/extractor, it can be permitted to do so; however, organization B must use its trained personnel to conduct the laundering. If organization B wishes to use organization A's equipment and personnel to conduct the laundering, then organization A must be a verified organization *[see 4.2.4(2)]*.

A verified organization has demonstrated the ability to conduct cleaning, inspection, and repairs to a third-party certification organization in accordance with this standard and is not required to have the approval of the element manufacturer to perform these services. Verified organizations are permitted to conduct these services for other organizations.

A verified ISP has demonstrated the ability to conduct cleaning, inspection, and repairs to a third-party certification organization in accordance with this standard and is not required to have the approval of the element manufacturer to perform these services.

A manufacturer verified in cleaning has demonstrated the ability to conduct cleaning to a third-party verification organization in accordance with this standard. A verified cleaner has demonstrated the ability to conduct cleaning to a third-party certification organization in accordance with this standard.

4.3.4.3*

~~Verified training organizations and manufacturer~~Manufacturer-trained organizations shall meet the training requirements in this section and shall be permitted to perform the activities identified in Table 4.3.4 for ~~verified training organizations and~~ manufacturer-trained organizations.

4.3.4.3.1*

Training shall be provided by ~~a verified training organization,~~ an element manufacturer of the same element type, a verified ISP, a verified organization, a verified cleaner, or any combination thereof.

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4.3.4.3.2*

~~The PPE technician shall be responsible for training~~ Training shall be consistent with the requirements and information provided in this standard and shall incorporate at least the following:

(1) Program *(see Section 4.3)*

(2) Education of the organization's members on the basics of PPE components, use, limitations, routine inspection, and preliminary exposure reduction

(3) Records *(see Section 4.4)*

(4) Protecting the public and personnel from exposure to contaminated PPE *(see Section 4.6)*

(5) Selection *(see Chapter 5)*

(6) Inspection *(see Chapter 6)*

(7) Cleaning *(see Chapter 7)*

(8) Repair *(see Chapter 8)*

(9) Storage *(see Chapter 9)*

(10) Retirement, disposition, and special incident procedures *(see Chapter 10)*

(11) Specific instructions, parameters, or procedures applicable to ensembles or ensemble elements with unique properties or performance as necessary

4.3.4.3.4

Organizations shall obtain and complete within one year of the edition issuance date the training required in 4.3.4.3.2 each time a new edition of NFPA 1850 is issued or there is a change in ~~PPE technician(s)~~personnel overseeing or performing the required aspects of an organization's program.

4.3.5*

The organization~~'s PPE technician(s)~~ shall develop specific criteria for removal of protective clothing and equipment from service~~,~~ in accordance with Chapter 10. ~~The criteria for retirement shall include, but not be limited to, issues that are specific to the ensembles or ensemble elements being used by the organization, the manufacturers' instructions, and the experience of the organization's PPE technician(s).~~

Commented [JV1]: Note: Text is moving to new sub below.

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4.3.5.1

The criteria for retirement shall include, but not be limited to, issues that are specific to the ensembles or ensemble elements being used by the organization, the manufacturers' instructions, and the experience of the organization~~'s PPE technician(s)~~.

4.4.1*

The organization~~'s PPE technician(s)~~ shall compile and maintain records on its structural firefighting protective ensembles and ensemble elements and proximity firefighting protective ensembles and ensemble elements.

4.4.4

The organization~~'s PPE technician(s)~~ shall compile and maintain records as required by 4.4.3 on firefighting protective garments with liquid and particulate contaminant protection. ~~The records shall include a list of specific required garments necessary for structural firefighting protective garments with optional liquid and particulate contaminant protection and proximity firefighting protective garments with optional liquid and particulate contaminant protection.~~

Commented [JV2]: Note: Text is moving to new sub below.

4.4.4.1

The records shall include ~~a~~ the list of specific ~~required~~ garments ~~necessary~~ certified to the ~~for~~ structural firefighting protective garments with optional liquid and particulate contaminant protection and proximity firefighting protective garments with optional liquid and particulate contaminant protection requirements.

4.4.5*

Where an organization keeps an element(s) in a rotating exchange program and does not assign it to a member, the organization~~'s PPE technician(s)~~ shall develop a program to clean and inspect these elements and the following records shall be kept:

(1) Manufacturer and model name or designation

(2) Manufacturer's identification number, lot number, or serial number

(3) Month and year of manufacture

(4) Date(s) and findings of advanced inspection(s)

(5) Date(s) and findings of advanced cleaning, disinfection or sanitization, or specialized cleaning

(6) Date(s) element is returned to rotating exchange inventory

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(7) Reasons for and entity that performed advanced cleaning, disinfection or sanitization, or specialized cleaning

(8) Date(s) of repair(s), entity that performed repair(s), and brief description of repair(s)

(9) Date of retirement

(10) Date and method of disposal

4.5.1

When issuing new structural firefighting protective ensembles and ensemble elements or proximity firefighting protective ensembles and ensemble elements, the organization~~'s PPE technician(s)~~ shall provide users with the instructions provided by the manufacturer on the care, use, and maintenance of the protective ensembles or ensemble elements, including any warnings provided by the manufacturer. ~~This information shall be permitted to be delivered from the manufacturer in various formats, including, but not limited to, printed materials or instructions to access the information electronically/digitally.~~

Commented [JV3]: Note: Text is moving to new sub below.

4.5.1.1

This information shall be permitted to be delivered from the manufacturer in various formats, including, but not limited to, printed materials or instructions to access the information electronically/digitally.

4.5.3

The organization~~'s PPE technician(s)~~ shall retain and make accessible to fire department personnel a copy of manufacturers' instructions regarding the care, use, and maintenance of the protective ensembles for reference purposes.

4.6.1

The organization~~'s PPE technician(s)~~ shall develop written SOPs that minimize the public's and the fire department personnel's exposure to soiled or contaminated structural or proximity firefighting protective ensembles and ensemble elements.

4.7 Reporting Personal Protective Equipment Health and Safety Concerns.

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4.7.1*

The organization~~, in coordination with its PPE technician(s),~~ shall report all personal protective equipment (PPE) health and safety concerns, if caused by a known or suspected element failure, to the element manufacturer and certification organization.

4.7.2*

The organization~~, in coordination with its PPE technician(s),~~ shall notify the manufacturer and the certification organization in writing.

4.7.3

The organization~~, in coordination with its PPE technician(s),~~ shall request written acknowledgment that the report of health and safety concerns was received by the element manufacturer and certification organization. ~~Written acknowledgment must be received within 30 days of the date of the report of health and safety concerns.~~

Commented [JV4]: Note: Text is moving to new sub below.

4.7.4

The element manufacturer and certification organization shall provide ~~Written~~ written acknowledgment ~~must be received~~ within 30 days of the date of the report of health and safety concerns.

Second Revision No. 62-NFPA 1850-2024 [Global Input]

Move Chapter 7 Cleaning and Decontamination (NFPA 1851) to before Chapter 6 Inspection (NFPA 1851).

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 17:28:15 EDT 2024

Committee Statement

Committee Statement: In general, inspections are not performed on dirty gear. It makes more sense place the chapters of the standard in the order of operations.
Response Message: SR-62-NFPA 1850-2024

Public Comment No. 46-NFPA 1850-2024 [Global Input]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All
Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.

Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
ok
Stull, Jeffrey O.
Agree

Second Revision No. 102-NFPA 1850-2024 [Detail]

Add new annex material for 11.3.7.1, as follows:

A.11.3.7.1

For the current edition of this standard, consideration was given to increasing the minimum acceptable average cleaning efficiency for both semivolatile organic compounds and heavy metals. However, due to a number of simultaneous changes and ongoing research for evaluating cleaning efficacy, the minimum requirements of 50 percent average cleaning efficiency was maintained for the following reasons:

(1) Some changes in the cleaning verification procedures have been introduced and their impact is not fully understood as to whether cleaning efficiency is improved or decreased.

(2) The cleaning efficiency procedures included in Section 13.4 involved a diverse set of semivolatile organic chemicals and heavy metals doped onto a sample outer shell material at a relatively high concentration that does not represent all materials in use by the fire service. Nevertheless, prior research by the Fire Protection Research Foundation and other organizations have shown that conventional washer/extractor advanced cleaning procedures generally show the same levels of contaminant removal for specific chemicals from field contaminated gear. Nevertheless, there is still a wide range of variables in cleaning effectiveness that are still being evaluated.

(3) ISPs and other organizations that are be verified for advanced cleaning might or might not provide specific enhancements as part of their procedures to achieve higher levels of contaminant removal that are not necessarily available for undertaken by individual fire departments as part of their standard operating procedures for advanced cleaning. At the time of publication of this standard, efforts are being undertaken for better understanding cleaning practices that are likely to yield improved removal of contaminants.

(4) No specific consensus was reached in the effort for revision of this standard for alternative ways for reporting cleaning effectiveness, such as a way for classifying cleaning verification results. Instead, new disclosure requirements for the listing of verified ISPs, organizations, or cleaners have been provided in paragraph 11.1.1.5.3 as part of the certification organization listings.

Organizations are cautioned for making exact comparisons between the required reported information by an ISP or other organization providing advanced cleaning. Small differences in the contaminant removal levels might simply be the result of variations in the test procedures that are similar to how the advanced cleaning itself can be undertaken at any facility performing advanced cleaning. Instead, organizations are encouraged to ask questions of ISPs as to the specific procedures

they offer for both advanced and specialized cleaning and become aware of the specific practices followed by the respective facility providing these services.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 13:47:10 EDT 2024

Committee Statement

Committee Statement: An annex section has been added to explain the rationalization for maintaining minimum levels of advanced cleaning verification performance that is the same as the previous edition of NFPA 1851.

Response Message: SR-102-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
3 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

McMillan, Neil

agree

Reidy, Jim

replace "doping" with a synonym that a regular end user may be more familiar with.

Stull, Jeffrey O.

Agree

Negative with Comment

Cinque, Vince

I believe it is a mistake to not endeavor to increase the cleaning effectiveness measurements for our firefighters. Contaminants and exposures continue to increase and remaining stagnate on the current requirement for another 5 years is inconsistent with the technical committee's responsibilities for end user health and safety.

Second Revision No. 66-NFPA 1850-2024 [Sections 1.1, 1.2]

1.1 Scope.

1.1.1

This standard shall specify the following:

(1) The minimum selection, care, and maintenance requirements for structural firefighting protective ensembles and proximity firefighting protective ensembles, and the individual ensemble elements that include garments, helmets, gloves, footwear, and interface components that are certified as compliant with ~~previous editions of~~ NFPA 1971~~and~~ or ~~NFPA 1971 as incorporated in the 2024 edition of~~ NFPA 1970 (1971) .

(2) Verification requirements of independent service providers (ISPs), manufacturers, and organizations for inspection, advanced cleaning, and repair services for structural firefighting and proximity firefighting protective garments certified as compliant with ~~previous editions of~~ NFPA 1971~~and~~ or ~~NFPA 1971 as incorporated in the 2024 edition of~~ NFPA 1970 (1971) .

(3) Optional requirements for detergents, other cleaning agents, sanitizers, disinfectants, advanced cleaning or sanitizing machines, and advanced cleaning or sanitizing processes for their effective use for cleaning or sanitization of structural firefighting and proximity firefighting protective garments and hoods certified as compliant with ~~previous editions of~~ NFPA 1971 ~~and~~ or ~~NFPA 1971 as incorporated in the 2024 edition of~~ NFPA 1970 (1971) .

(4) Optional requirements for detergents, other cleaning agents, sanitizers, disinfectants, advanced cleaning or sanitizing machines, and advanced cleaning or sanitizing processes for their impact on selected performance properties following the repeated cleaning or sanitization of structural firefighting and proximity firefighting protective garments and hoods certified as compliant with ~~previous editions of~~ NFPA 1971 ~~and~~ or ~~NFPA 1971 as incorporated in the 2024 edition of~~ NFPA 1970 (1971) .

(5) The minimum requirements for the selection, care, and maintenance of open-circuit self-contained breathing apparatus (SCBA) ~~and combination SCBA/supplied air respirator (SAR) that are used for respiratory protection during emergency, tactical, or technical operations, in environments where the atmosphere is immediately dangerous to life and health (IDLH) or could become oxygen deficient or IDLH~~ certified as compliant with NFPA 1981 or NFPA 1970 (1981) .

(6) The minimum requirements for ~~a PPE technician and an SCBA technician~~ the selection, care, and maintenance of respiratory protection equipment for tactical and technical operations certified as compliant with NFPA 1986 .

1.1.2

This standard shall not specify requirements for any closed-circuit SCBA.

1.1.3

This standard shall not apply to protective ensembles or protective clothing that are compliant with NFPA 1950, NFPA 1951 , NFPA 1977 , NFPA 1990 , NFPA 1991 , NFPA 1992 , NFPA 1994 , or NFPA ~~1990~~ 1999 .

1.1.4

Nothing herein shall restrict any jurisdiction from exceeding these minimum requirements.

1.2 Purpose.

1.2.1

The purpose of this standard shall be to establish the following:

(1) A program for structural firefighting protective ensembles and ensemble elements and for proximity firefighting protective ensembles and ensemble elements to reduce the safety risks and potential health risks associated with poorly maintained, contaminated, or damaged protective ensembles and ensemble elements

(2) Basic criteria for selection, inspection, cleaning, decontamination, repair, storage, and retirement of structural firefighting protective ensembles or ensemble elements and proximity firefighting protective ensembles or ensemble elements

(3) Verification procedures for independent service providers (ISPs), manufacturers, and organizations for the inspection, cleaning, and repair of structural firefighting and proximity firefighting protective garments.

(4) Optional requirements for detergents, other cleaning agents, sanitizers, disinfectants, advanced cleaning or sanitizing machines, and advanced cleaning or sanitization processes for structural firefighting and proximity firefighting protective garments and hoods.

(5) Optional requirements for detergents, other cleaning agents, sanitizers, disinfectants, advanced cleaning or sanitizing machines, and advanced cleaning or sanitizing processes for their impact on selected performance properties following the repeated cleaning or sanitization of structural firefighting and proximity firefighting protective garments and hoods certified as compliant with ~~previous editions of~~ NFPA 1971 ~~and~~ or ~~NFPA 1971 as incorporated in the 2024 edition of~~ NFPA 1970 (1971) .

(6) Procedures as part of a program to provide care and maintenance for open-circuit SCBA ~~and combination SCBA/SAR~~ to reduce the safety risks and potential health risks associated with poorly maintained, contaminated, or damaged SCBA.

(7) Basic criteria for the evaluation and selection process associated with purchasing open-circuit SCBA to ensure only SCBA that meet the requirements of ~~NFPA 1981 as incorporated in the 2024 edition of~~ NFPA 1970(1981) or NFPA 1986 are acquired for use by emergency services organizations.

~~Basic criteria for responsibilities of a PPE technician and an SCBA technician.~~

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 23:41:21 EDT 2024

Committee Statement

Committee Statement: Sections 1.1 and 1.2 are updated to better reflect the content of the standard.
Response Message: SR-66-NFPA 1850-2024

Public Comment No. 1-NFPA 1850-2024 [Global Input]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments

0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 71-NFPA 1850-2024 [Section No. 2.3]

2.3 Other Publications.

2.3.1 AATCC Publications.

American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

~~AATCC TM135~~ AATCC LP1 , ~~*Test Method for Dimensional Changes of Fabrics after Home Laundering*~~ *Home Laundering: Machine Washing* , ~~2018~~ 2021 .

AATCC TM198, *Test Method for Horizontal Wicking of Textiles*, 2020.

2.3.2 ASTM Publications.

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D2261, *Standard Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine)*, 2013, 2017e1.

ASTM D5034, *Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)*, 2021.

ASTM D5755, *Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Surface Loading* , 2009 (2014)e1 (withdrawn 2023).

~~ASTM E2406, *Standard Test Method for Evaluation of Laundry Sanitizers and Disinfectants for Use in High Efficiency Washing Operations* , 2016.~~

2.3.3 ISO Publications.

International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

ISO/IEC 17011, *Conformity assessment — Requirements for accreditation bodies accrediting conformity assessment bodies*, 2017.

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*, 2017.

ISO/IEC 17065, *Conformity assessment — Requirements for bodies certifying products, processes and services*, 2012.

ISO 23702-1, *Leather – Per- and polyfluoroalkyl substances – Part 1: Determination of non-volatile compounds by extraction method using liquid chromatography* , 2023.

2.3.4 US Government Publications.

US Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

Title 29, Code of Federal Regulations, Part 1910.1030, “Bloodborne Pathogens.”

Title 29, Code of Federal Regulations, Part 1910.134, “Respiratory Protection~~,~~ . ” ~~7 August 2012.~~

Title 29, Code of Federal Regulations, Part 1910.156, “Fire Brigades~~,~~ . ” ~~12 December 2008.~~

Title 42, Code of Federal Regulations, Part 84, “Approval of Respiratory Protective Devices.”

2.3.5 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2020.

Supplemental Information

File Name	Description	Approved
1850_SPF_SR71_2.2.docx	Staff use - Section 2.2 NFPA References - FOR EDITORIAL USE	
1850_SPF_SR71_2.3.docx	Staff use - Section 2.3 Other References	
1850_SR-71_2.3_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Sat Aug 17 01:03:15 EDT 2024

Committee Statement

Committee Statement: References are updated in accordance with the Manual of Style.
Response Message: SR-71-NFPA 1850-2024

Public Comment No. 6-NFPA 1850-2024 [Chapter 2]

Public Comment No. 8-NFPA 1850-2024 [Section No. 2.3.4]

Public Comment No. 7-NFPA 1850-2024 [Global Input]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 18-NFPA 1850-2024 [Section No. 3.3.17]

3.3.17* Contamination/Contaminated.

The presence or accumulation of products of combustion ~~and~~ or other hazardous materials on or in protective clothing and equipment including, but not limited to, carcinogenic, toxic, corrosive, or allergy-causing chemicals; body fluids; infectious microorganisms; or CBRN terrorism agents.

A.3.3.17 Contamination/Contaminated .

Ensembles and ensemble elements can be found with hazardous chemicals, polymers, metals, or microorganisms. They can also be exposed to products of combustion and other hazardous materials in several ways through contact with gases/vapors, liquids, or particulates. A fire in which the firefighter wears SCBA and is exposed to fire smoke, other particulates, and fire gases represents a common source of contamination.

The extent and persistency of the contamination in the ensemble or ensemble element will vary with the type of contaminant, the length of the contamination period, and the means by which the ensemble or ensemble elements are contaminated. In general, contamination that is persistent represents the greatest concern since these forms of contaminants might remain in the clothing for extended periods of time and provide continued exposure to the firefighter.

Examples of common contaminants found in fires include, but are not limited to, the following:

(1) Heavy inorganic metals (e.g., arsenic, antimony, cadmium, chromium, mercury)

(2) Semivolatile organic compounds, including but not limited to, the following:

  (a) Polynuclear aromatic hydrocarbons (PAHs) (e.g., anthracene, chrysene, fluoranthene, naphthalene, pyrene)

  (b) Phthalate plasticizers [e.g., benzyl butyl phthalate (BPP), bis(2-ethylhexyl) phthalate (DEHP), dimethyl phthalate]

  (c) Polybrominated diphenyl ether flame retardants (PBDEs) [e.g., pentabromodiphenyl ether (BDE 99), hexabromodiphenyl ether (BDE 153)]

  (d) Polychlorinated biphenyls (PCBs) (e.g., 2,2,3,3,4,4,5,5-Octachlorobiphenyl)

  (e) Substituted phenols (e.g., 2-methylphenol and pentachlorophenol)

(3) Hazardous particulates (e.g., soot, asbestos, silica, lead dust)

In contrast, many volatile organic chemicals such as formaldehyde and benzene, while hazardous, easily evaporate unless bound in the materials used in the element. In addition, carbon particles that make up the majority of smoke actually absorb and hold many products of combustion, resulting in persistent contamination.

Certain materials, components, or portions of an ensemble element or ensemble might be more susceptible to contamination. For example, the textile fabric components of a protective helmet might be more easily contaminated than the hard surface of the helmet shell.

Supplemental Information

File Name	Description	Approved
1850_SPF_SR18_3.3.17.docx	staff use	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Thu Aug 15 10:27:20 EDT 2024

Committee Statement

Committee Statement: Contamination, or the presence of contaminants is not limited to an accumulation of hazardous agents, but may be inherent in products covered by this standard. The initial language assumes that the presence of contaminants is only possible through the accumulation of toxins from combustion.

Response Message: SR-18-NFPA 1850-2024

Public Comment No. 17-NFPA 1850-2024 [Section No. A.3.3.17]

Public Comment No. 9-NFPA 1850-2024 [Section No. 3.3.17]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 19-NFPA 1850-2024 [New Section after 3.3.24]

3.3.24.1* Disinfection/Disinfecting.

The use of an antimicrobial agent (i.e., disinfectant) or process to destroy or irreversibly inactivate specific microorganisms, such as fungi and bacteria, but not necessarily their spores, on inanimate surfaces and objects.

A.3.3.24.1 Disinfection/Disinfecting.

The effectiveness of disinfection often varies with the type of microorganism. Some microorganisms can be resistant to various types of disinfectants or disinfection processes.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Thu Aug 15 10:36:03 EDT 2024

Committee Statement

Committee Statement: A separate definition and related explanatory annex section for disinfecting and disinfection has been added to address important distinctions between antimicrobial agents and processes which many not depend on the use of a disinfectant.

Response Message: SR-19-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 20-NFPA 1850-2024 [Section No. 3.3.55]

3.3.55 Inherent Flame Resistance.

Flame resistance that is derived from the essential characteristics of the fiber or polymer without additives, coatings, or finishes .

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Thu Aug 15 10:40:30 EDT 2024

Committee Statement

Committee Statement: The definition has been clarified to exclude other ways that materials may be made flame resistance that are not intrinsic to the base material that are less obvious to the end user.

Response Message: SR-20-NFPA 1850-2024

Public Comment No. 10-NFPA 1850-2024 [Section No. 3.3.55]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn

Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 21-NFPA 1850-2024 [Section No. 3.3.74]

3.3.74* Preliminary Exposure Reduction (PER).

Techniques for reducing soiling and contamination levels on the exterior of the ensemble or ensemble element and SCBA following incident operations to minimize spread of contamination .

A.3.3.74 Preliminary Exposure Reduction (PER).

The primary purposes for PER actions are to reduce the exposure of the individual end users to soiling, products of combustion, and persistent contamination during doffing of ensembles, ensemble elements, and SCBA; and to minimize the spread of that contamination to apparatus, vehicles, ~~and the outside environment~~ fire stations, and commercial or residential facilities . PER techniques for the outside of the ensemble, ensemble elements, and SCBA include brushing off dry debris with a soft bristle brush, rinsing off debris with a low-pressure, low-volume water hose, and spot cleaning for nonaluminized elements. Only a soft cloth or sponge should be used to remove debris on aluminized element surfaces.

These actions, conducted by an individual with assistance, are intended to begin the removal of soiling and contamination following the exposure of the individual on the fireground or at the emergency scene. The goal of PER is reducing contamination for the exposed ensemble or ensemble elements prior to leaving the scene. These techniques should be applied while the member is still wearing their SCBA and is still on air to prevent respiratory exposure from any off-gassing of contaminants or to dust from airborne debris. It is realized that unforeseen circumstances due to the limitation of resources (e.g., spare ensembles, ensemble elements, or SCBA), inclement weather, and other factors can affect the ability to apply PER; however, it is important PER be conducted after fireground and other emergency operations where protective ensembles and SCBA are subject to soiling and contamination.

In the hazardous materials industry, these actions are often referred to by the term *gross decontamination*, indicating the rinsing of the first responder or the actions to partially remove chemical residues or other hazardous substances after leaving the hot (i.e., contaminated) zone and before entering the cold (i.e., clean) zone during a hazardous materials incident. NFPA 1850 uses the term *preliminary exposure reduction* because the term *decontamination* suggests removal of contaminant. While there is an expectation that some of the surface contamination could be removed from protective ensembles or ensemble elements, gross decontamination or preliminary exposure reduction does not guarantee full cleaning or decontamination for all parts of the protective ensembles or ensemble elements.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Thu Aug 15 10:49:29 EDT 2024

Committee Statement

Committee Statement: The revised definition indicates the purpose of preliminary exposure reduction and the how it applies to minimizing cross-contamination of facilities, such as fire stations and commercial or residential facilities.

Response Message: SR-21-NFPA 1850-2024

Public Comment No. 18-NFPA 1850-2024 [Section No. A.3.3.74]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 23-NFPA 1850-2024 [New Section after 3.3.93]

3.3.93.1* Sanitization/Sanitizing.

The use of an antimicrobial agent (i.e., sanitizer) or process to reduce microorganisms from an inanimate environment to levels considered safe by public health codes or regulations.

A.3.3.93.1 Sanitization/Sanitizing.

The effectiveness of sanitization often varies with the type of microorganism. Some microorganisms can be resistant to various types of sanitizers or sanitization processes.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Thu Aug 15 11:20:18 EDT 2024

Committee Statement

Committee Statement: A separate definition and related explanatory annex section for sanitizing and sanitization has been added to address important distinctions between antimicrobial agents and processes which may not depend on the use of a sanitizer.

Response Message: SR-23-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 24-NFPA 1850-2024 [Section No. 3.3.106]

3.3.106* Spot Cleaning.

The application of a cleaning agent or process that is focused on a small area of the protective element to remove persistent, heavy soiling or contamination .

A.3.3.106 Spot Cleaning.

Examples of spot cleaning include using a suitable cleaning agent that meets the detergent requirements in this standard in terms of pH or separate cleaning verification criteria in concert with warm water and scrubbing using an appropriate brush, the application of a cleaning agent without any scrubbing, or subjecting part of the element to a nondestructive process.

While spot cleaning can be used as part of an advanced cleaning, it is not considered to be advanced cleaning by itself and is also not considered to be part of advanced cleaning for ~~the purposes of~~ advanced cleaning verification.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Thu Aug 15 11:24:32 EDT 2024

Committee Statement

Committee Statement: The definition of spot cleaning has been updated to include its intended purpose. Example of possible spot cleaning approaches have been added to the related annex section.

Response Message: SR-24-NFPA 1850-2024

Public Comment No. 19-NFPA 1850-2024 [Section No. 3.3.106]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 70-NFPA 1850-2024 [Section No. 3.3.122]

3.3.122 Technician.

3.3.122.1* Personal Protective Clothing (PPC) Manager.

An individual assigned or authorized to manage the organization's PPC program.

A.3.3.122.1 Personal Protective Clothing (PPC) Manager.

The PPC manager should be trained in the selection, care, and maintenance of PPC in accordance with this standard and manufacturer's instructions.

The PPC manager is responsible for educating the organization's members on the requirements of the program.

The PPC manager might also be the PPC technician. *(See 4.2.4.1 .)*

Personal protective equipment (PPE) protects every organization's most valuable asset – its members. Therefore, it is essential that proper attention be given to PPE and the PPE program by including a PPC manager in the organization's PPE program.

The PPC manager should be part of the gear evaluation and selection team.

3.3.122.2* ~~PPE~~ Personal Protective Clothing (PPC) Technician.

~~The individual(s) trained and certified to professional qualifications and assigned and authorized by the organization to manage the PPE program as described in this standard, including training users on basics of PPE function, care, and maintenance.~~ An individual assigned or authorized to ensure the organization's PPC is in proper working condition and is compliant with relevant standards.

A.3.3.122.2 Personal Protective Clothing (~~PPE~~ PPC) Technician.

The PPC technician is an individual who is properly trained and equipped to clean, inspect, and maintain the organization's PPC in accordance with this standard.

The PPC technician should be part of the gear evaluation and selection team.

~~The individual or individuals who are appointed by the organization must meet the qualifications outlined in this standard. It is important that the individual or individuals have the requisite knowledge and skills to function effectively in this position. The individual or individuals might or might not be directly involved the in the hands-on application of this standard. If they are not directly involved, they are responsible to ensure those involved have the requisite knowledge and skills to function effectively in their position.~~

3.3.122.3 Respiratory Protection Equipment Technician.

An individual qualified and authorized by the compliant respiratory protection equipment manufacturer to provide specified care and maintenance to the product and perform inspection, repair, and testing beyond the level classified as "user repair."

Supplemental Information

File Name	Description	Approved
1850_SPF_SR70_3.3.122.docx	staff use	

1850_SR-70_3.3.122_SPF_legislative_changes.docx for prod use

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Sat Aug 17 00:42:13 EDT 2024

Committee Statement

Committee Statement: In the First Draft, the committee added text based on a single position for a PPE Technician. It has been divided into two separate positions - Manager and Technician - to separate the responsibilities of overseeing the entire lifecycle of the gear from the task-based work of maintaining the gear. The descriptor "PPE" is changed to "PPC" to clarify that this manager/technician does not maintain other types of PPE, such as respiratory protection equipment. The intended scopes of responsibility and training for these positions will be addressed in definitions and new Annex E.

Response Message: SR-70-NFPA 1850-2024

Public Comment No. 50-NFPA 1850-2024 [New Section after 3.3.122.1]

Public Comment No. 49-NFPA 1850-2024 [Section No. A.3.3.122.1]

Public Comment No. 48-NFPA 1850-2024 [Section No. 3.3.122.1]

Public Comment No. 62-NFPA 1850-2024 [Section No. 3.3.122.1]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan

Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 68-NFPA 1850-2024 [Section No. 4.1]

4.1 Administration.

4.1.1 Scope.

4.1.1.1

~~This standard~~ Chapters 4 through 13 shall specify the minimum selection, care, and maintenance requirements for structural firefighting protective ensembles, proximity firefighting protective ensembles, and the individual ensemble elements that include garments, helmets, gloves, footwear, and interface components that are compliant with ~~previous editions of~~ NFPA 1971~~and~~ or ~~NFPA 1971 as incorporated in the 2024 edition of~~ NFPA 1970 (1971) .

4.1.1.1.1

~~This standard~~ Chapters 4 through 13 shall also specify the minimum selection, care, and maintenance requirements for structural firefighting protective garments with optional liquid and particulate contaminant protection and for proximity firefighting protective garments with optional liquid and particulate contaminant protection.

4.1.1.2

~~Verification~~ Chapters 4 through 13 shall also specify verification requirements of independent service providers (ISPs), manufacturers, and organizations for inspection, advanced cleaning, and repair services for structural firefighting and proximity firefighting protective garments certified as compliant with ~~previous editions of~~ NFPA 1971~~and~~ or ~~NFPA 1971 as incorporated in the 2024 edition of~~ NFPA 1970 (1971) .

4.1.1.3

~~This standard~~ Chapters 4 through 13 shall also specify optional requirements for detergents, other cleaning agents, sanitizers, disinfectants, advanced cleaning or sanitizing machines, and advanced cleaning or sanitizing processes for their effective use for cleaning or sanitization of structural firefighting and proximity firefighting protective garments and hoods certified as compliant with ~~previous editions of~~ NFPA 1971~~and~~ or ~~NFPA 1971 as incorporated in the 2024 edition of~~ NFPA 1970 (1971) .

4.1.1.4

~~This standard~~ Chapters 4 through 13 shall also specify optional requirements for detergents, other cleaning agents, sanitizers, disinfectants, advanced cleaning or sanitizing machines, and advanced cleaning or sanitizing processes for their impact on selected performance properties following the repeated cleaning or sanitization of structural firefighting and proximity firefighting protective garments and hoods certified as compliant with ~~previous editions of~~ NFPA 1971~~and~~ or ~~NFPA 1971 as incorporated in the 2024 edition of~~ NFPA 1970 (1971) .

~~**4.1.1.5**~~

~~This standard shall also specify the minimum requirements for an organization's certified PPE technician(s).~~

4.1.1.5

~~This standard~~ Chapters 4 through 13 shall not specify requirements for other organizational programs such as appropriate use of structural firefighting or proximity firefighting protective ensembles for training, for operations, or for infection control, because these programs are under the jurisdiction of other NFPA standards.

4.1.1.6

~~This standard~~ Chapters 4 through 13 shall not apply to protective ensembles or protective clothing that are compliant with NFPA 1950, NFPA 1951 , NFPA 1977, ~~and~~ NFPA 1990, NFPA 1991 , NFPA 1994 , or NFPA 1999 .

4.1.1.7

~~This standard~~ Chapters 4 through 13 shall not be construed as addressing all the safety concerns associated with the use of compliant protective ensembles or ensemble elements. ~~It shall be the responsibility of the persons and organizations that use compliant protective ensembles or ensemble elements to establish safety and health practices and to determine the applicability of regulatory limitations prior to use~~ .

4.1.1.7.1

It shall be the responsibility of the persons and organizations that use compliant protective ensembles or ensemble elements to establish safety and health practices and to determine the applicability of regulatory limitations prior to use.

4.1.1.8

~~This standard~~ Chapters 4 through 13 shall not be construed as addressing all the safety concerns, if any, associated with the use of this standard by testing or repair facilities. ~~It shall be the responsibility of the persons and organizations that use this standard to conduct testing of protective ensembles or ensemble elements to establish safety and health practices and to determine the applicability of regulatory limitations prior to using this standard for any designing, manufacturing, and testing.~~

4.1.1.8.1

It shall be the responsibility of the persons and organizations that use this standard to conduct testing of protective ensembles or ensemble elements to establish safety and health practices and to determine the applicability of regulatory limitations prior to using this standard for any designing, manufacturing, and testing.

4.1.1.9

Nothing herein shall restrict any jurisdiction from exceeding these minimum requirements.

4.1.2 Purpose.

4.1.2.1

The purpose of ~~this standard~~ Chapters 4 through 13 shall be to establish a program for structural firefighting protective ensembles and ensemble elements and for proximity firefighting protective ensembles and ensemble elements to reduce the safety risks and potential health risks associated with poorly maintained, contaminated, or damaged protective ensembles and ensemble elements.

4.1.2.2

The purpose of ~~this standard~~ Chapters 4 through 13 shall also be to establish basic criteria for selection, inspection, cleaning, decontamination, repair, storage, and retirement of structural firefighting protective ensembles or ensemble elements and proximity firefighting protective ensembles or ensemble elements.

~~**4.1.2.3**~~

~~The purpose of this standard shall also be to establish the criteria for an organization's PPE technician(s) responsibilities regarding PPE program management.~~

4.1.3 Application.

4.1.3.1

~~This standard~~ Chapters 4 through 13 shall apply to structural firefighting and proximity firefighting ensembles and ensemble elements certified as compliant with ~~previous editions of~~ NFPA 1971~~and NFPA 1971 as incorporated in the 2024 edition of~~ or NFPA 1970 (1971) .

4.1.3.1.1

~~This standard~~ Chapters 4 through 13 shall also apply to structural firefighting protective garments with optional liquid and particulate contaminant protection and to proximity firefighting protective garments with optional liquid and particulate contaminant protection.

4.1.3.2

~~This standard~~ Chapters 4 through 13 shall also apply to verification requirements of independent service providers (ISPs), manufacturers, and organizations for inspection, advanced cleaning, and repair services for structural firefighting and proximity firefighting protective garments certified as compliant with ~~previous editions of~~ NFPA 1971~~and NFPA 1971 as incorporated in the 2024 edition of~~ or NFPA 1970 (1971) .

4.1.3.3

~~This standard~~ Chapters 4 through 13 shall also apply to detergents, other cleaning agents, sanitizers, disinfectants, advanced cleaning or sanitizing machines, and advanced cleaning or sanitizing processes for their effective use for cleaning or sanitization of structural firefighting and proximity firefighting protective garments and hoods certified as compliant with ~~previous editions of~~ NFPA 1971~~and NFPA 1971 as incorporated in the 2024 edition of~~ or NFPA 1970 (1971) .

4.1.3.4

~~This standard~~ Chapters 4 through 13 shall also apply to detergents, other cleaning agents, sanitizers, disinfectants, advanced cleaning or sanitizing machines, and advanced cleaning or sanitizing processes for their impact on selected performance properties following the repeated cleaning or sanitization of structural firefighting and proximity firefighting protective garments and hoods certified as compliant with ~~previous editions of~~ NFPA 1971~~and NFPA 1971 as incorporated in the 2024 edition of~~ or NFPA 1970 (1971) .

~~**4.1.3.5**~~

~~This standard shall also apply to the organization's certified PPE technician(s).~~

4.1.3.5

~~This standard~~ Chapters 4 through 13 shall not apply to other organizational programs such as appropriate use of structural firefighting or proximity firefighting protective ensembles for training, operations, or infection control, because these programs are under the jurisdiction of other NFPA standards.

4.1.3.6

Chapters 4 through 13~~of this standard~~ shall not apply to respiratory protective equipment. *(See Chapter 14 .)*

4.1.3.7

The requirements of ~~this standard~~ Chapters 4 through 13 shall not apply to accessories attached to any element of the structural firefighting protective ensemble or the proximity firefighting protective ensemble unless specifically addressed herein.

~~**4.1.4** Units.~~

~~**4.1.4.1**~~

~~In this standard, values for measurement are followed by an equivalent in parentheses, but only the first stated value shall be regarded as the requirement.~~

~~**4.1.4.2**~~

~~Equivalent values in parentheses shall not be considered as the requirement because these values are approximate.~~

Supplemental Information

File Name	Description	Approved
1850_SPF_SR68_1.1.docx	staff use	
1850_SR-68_4.1_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 23:52:18 EDT 2024

Committee Statement

Committee Statement: The administrative sections for Chapters 4 through 12 are updated to better reflect the content of these chapters. Section 4.1.4 on units is deleted because it is redundant to Section 1.4.

Response Message: SR-68-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 12-NFPA 1850-2024 [Section No. 4.2.4]

4.2.4

~~The program shall have one or more PPE technicians to manage the organization's PPE program.~~ The organization, as part of the PPE program, shall appoint a personal protective clothing (PPC) manager. *(See Annex F .)*

4.2.4.1

~~The PPE technician(s) shall be knowledgeable about the performance characteristics and limitations of each PPE element~~ Responsibility for cleaning, inspection, and maintenance of PPC shall be assigned to the PPC manager, one or more PPC technicians, a verified organization, a verified ISP, or a combination thereof .

~~**4.2.4.2**~~

~~The PPE technician(s) shall be responsible for educating and training all organizational members who use PPE on the performance characteristics and limitations of each element.~~

~~**4.2.4.3**~~

~~The PPE technician(s) shall be knowledgeable and responsible for the following areas of each PPE element: education, selection, sizing, cleaning, drying, inspection, repair, storage, retirement, and disposal.~~

Supplemental Information

File Name	Description	Approved
1850_SPF_SR12_4.2.4.docx	staff use	
1850_SR-12_4.2.4_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Aug 14 14:59:37 EDT 2024

Committee Statement

Committee Statement: In the First Draft, the committee added text based on a single position for a PPE Technician. It has been divided into two separate positions - Manager and Technician - to separate the responsibilities of overseeing the entire lifecycle of the gear from the task-based work of maintaining the gear. The descriptor "PPE" is changed to "PPC" to clarify that this manager/technician does not maintain other types of PPE, such as respiratory protection equipment. Language is included to clarify that these roles can be assigned to a single person or be distributed between members and/or outside organizations. The intended scopes of responsibility and training for these positions will be addressed in definitions and new Annex E.

Response Message: SR-12-NFPA 1850-2024

Public Comment No. 51-NFPA 1850-2024 [Section No. 4.2.4]

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 73-NFPA 1850-2024 [Section No. 5.1.3]

Global SR-123

5.1.3*

The organization~~'s PPE technician(s)~~ shall review the current editions of NFPA 1970, NFPA 1990, NFPA ~~1500~~1550, NFPA 600, any applicable federal or state OSHA standards, and related international requirements relating to structural firefighting protective ensembles and ensemble elements to determine how they affect the selection process.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Sat Aug 17 01:26:37 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1500 is updated to the consolidated document, NFPA 1550.

Response Message: SR-73-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 25-NFPA 1850-2024 [Section No. 5.1.5.2]

5.1.5.2*

Organizations shall ~~account for~~ consider restricted substances that are present as part of the composition of materials and components used in the construction of protective elements as part of their selection process and in their compliance with federal, state, and local regulations related to certain restricted substances .

A.5.1.5.2

~~The 2024 edition of~~ NFPA 1970 (1971) includes specific requirements for the measurement of restricted substances in specific materials or components that are used in the construction of protective elements. These requirements dictate that specified restricted substances ~~either not be present or~~ are subject to ~~a~~ maximum limits . There are additional requirements for permitting the manufacturer of a protective element ~~be able~~ to indicate that their element ~~is PFAS-free based on~~ has limited levels of PFAS in key materials and components based on optional labeling language provided in 6.1.7.5 ~~in~~ of NFPA 1970.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Thu Aug 15 11:44:28 EDT 2024

Committee Statement

Committee Statement: The requirement was changed from "account" to "consider," which is a more appropriate action in the selection process. Other changes align the text with NFPA 1970.
Response Message: SR-25-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim

Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 109-NFPA 1850-2024 [New Section after 5.1.11]

5.1.13*

Organizations shall consider applying a single advanced cleaning for newly purchased protective garments and other elements recommended for machine-based cleaning to reduce any easily removed residues of substances used in the fabrication of material components or manufacture of garments prior to use.

A.5.1.13

some research demonstrates that excess substances remaining in materials or imparted during the manufacturing process can be lessened by the application of advanced cleaning methods. this specific requirement is optional as it only suggests organizations consider undertaking this practice for newly acquired protective garments and other elements that would be subjected to machine-based advanced cleaning.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 15:13:04 EDT 2024

Committee Statement

Committee Statement: Evidence presented in recent studies by Peaslee (2020) and NIST (2024) suggest that residues and easily removable intrinsic contaminants can be reduced in protective garments that are first subjected to an advanced cleaning prior to use. In addition, experience has shown that gear performance can be enhanced by washing due to contraction of fibers.

Response Message: SR-109-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
3 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Stull, Jeffrey O.
Agree

Negative with Comment

Reidy, Jim
x

Second Revision No. 61-NFPA 1850-2024 [Section No. 6.2.2.5]

7.2.2.5

Footwear elements shall be inspected for the following:

(1) Soiling

(2) Contamination

(3) Physical damage such as the following:

  (a) Cuts, tears, and punctures

  (b) Thermal damage (such as charring, burn holes, melting, or discoloration of any layer)

  (c) Exposed or deformed protective toe, protective midsole, or shank

(4) Loss of water resistance

(5) Closure system component damage and functionality

(6) Loss of seam integrity and broken or missing stitches

(7) Peeling or separation of outer sole from upper or mid-sole

Supplemental Information

File Name	Description	Approved
1850_SPF_SR61_6.2.2.5.docx	staff use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 16:39:30 EDT 2024

Committee Statement

Committee Statement: Adhesives used in cementing outer soles to mid-soles and uppers can be compromised by submersion in heated liquids (water), attacking the bond between the outer and upper footwear components. In the absence of a test in NFPA 1970 to check for the delamination of outer soles under such conditions, specifying inspection for these potential occurrences is reasonable.

Response Message: SR-61-NFPA 1850-2024

Public Comment No. 11-NFPA 1850-2024 [Section No. 6.2.2.5]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters

6 Not Returned

23 Affirmative All

4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 63-NFPA 1850-2024 [Section No. 6.3.5.2.1.1]

7.3.5.2.1.1

Particulate-blocking barrier in the hood material shall be evaluated by the light test to have no damage, defects, or separations from original construction to retain particulate protection efficiencies. *[See Figure 7.3.5.2.1.1(a) through Figure 7.3.5.2.1.1(c).]*

Figure 7.3.5.2.1.1(a) Example of a Quilted ~~Head Lamp~~ Hood .



Figure 7.3.5.2.1.1(b) Example of a Laminated ~~Head Lamp~~ Hood .



Figure 7.3.5.2.1.1(c) Example of a Hood Inspection Device.



Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 17:30:09 EDT 2024

Committee Statement

Committee Statement: The figure titles are corrected. The images are of hoods, not "head lamps."
Response Message: SR-63-NFPA 1850-2024

Public Comment No. 63-NFPA 1850-2024 [Section No. 6.3.5.2.1.1]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 107-NFPA 1850-2024 [Section No. 7.1.1.2]

6.1.1.2

The organization~~'s PPE technician(s)~~ shall use the decision tool provided in Figure 6.1.1.2(a) and Figure 6.1.1.2(b) to assist in determining the appropriate cleaning procedures to follow as specified in Sections 6.2 through 6.5.

Figure 6.1.1.2(a) Approach for Deciding Handling, Cleaning, and Disposition of Ensemble Elements.

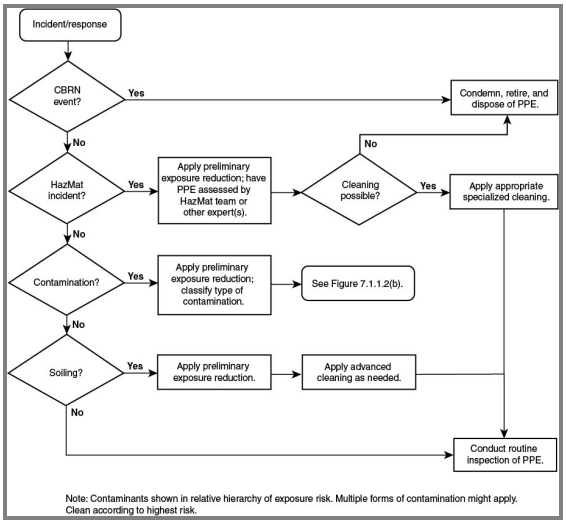
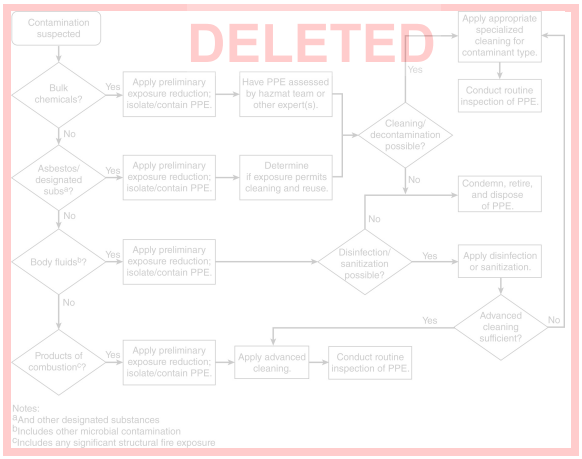
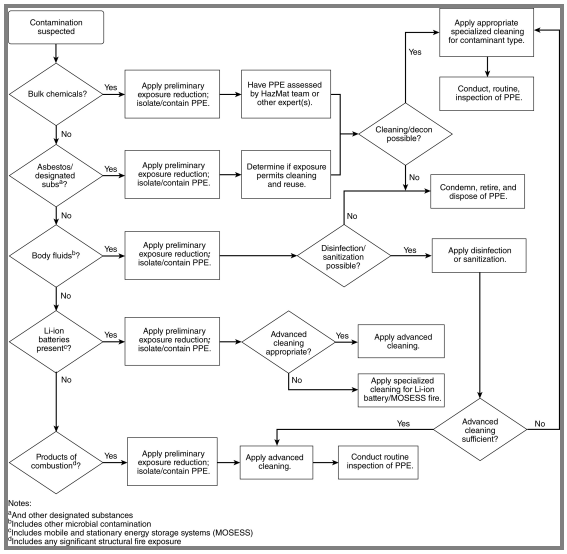


Figure 6.1.1.2(b) Approach for Addressing Specific Types of Contamination.





Supplemental Information

File Name	Description	Approved
1850_SPF_SR107_Figure7.1.1.2.docx	Staff use - for editorial	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Wed Sep 04 14:45:11 EDT 2024

Committee Statement

Committee Statement: A separate decision tree element has been added to address Li-ion battery fires as part of 7.1.1.2(b), which requires additional consideration if specialized cleaning is needed. Associated language is provided to address these procedures as part of new Section 7.1.3.5.

Response Message: SR-107-NFPA 1850-2024

Public Comment No. 79-NFPA 1850-2024 [Section No. 7.1.1.2]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan

Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed

McMillan, Neil
agree

Reidy, Jim
x

Stull, Jeffrey O.
Agree

Second Revision No. 108-NFPA 1850-2024 [New Section after 7.1.3.3.2.2]

6.1.3.3.2.3

If testing of ensembles or ensemble elements is part of the process for determining if protective ensembles having suspected or known asbestos contamination can be decontaminated or are considered for decontamination, the verification requirements in 11.6.6 shall be followed.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 15:02:31 EDT 2024

Committee Statement

Committee Statement: Viable industry practice and annex information in the prior edition of NFPA 1851 have established suitable non-destructive procedures for evaluating if protective elements have asbestos contamination. This annex information has been moved into the optional verifications as part of Section 11.6.6 for establishing where asbestos contamination is present on a protective element that can then inform decisions whether contamination is present and if cleaning is effective using methodology provided in Section 12.11. A new section 7.1.3.3.2.3 has been established to point to how testing must be performed if part of the decision process for decided to decontaminate protective elements suspected or known to be contaminated with asbestos.

Response Message: SR-108-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 106-NFPA 1850-2024 [New Section after 7.1.3.4]

6.1.3.5 Lithium-ion Battery and Mobile and Stationary Energy Storage System Decontamination Actions.

6.1.3.5.1

Ensembles and ensemble elements that have been exposed to fires involving lithium-ion batteries or mobile and stationary energy storage systems shall be subject to preliminary exposure reduction as specified in Section 6.2 and isolated, tagged, and bagged at the incident scene.

6.1.3.5.2*

Following preliminary exposure reduction, a decision shall be made whether ensembles and ensemble elements are subject to advanced cleaning, or specialized cleaning including consideration of the following factors:

(1) The total amount and proportion of fire contents attributed to lithium-ion batteries or related products.

(2) The degree to which firefighters have expected exposure to lithium-ion battery or related product decontamination products from the fire.

(3)* The environmental characteristics of the fire location.

A.6.1.3.5.2(3) _

Fire and exposure characteristics can be different for closed environments (e.g., an electric vehicle inside a garage) and open environments (e.g., an electric vehicle on a highway).

(4) The availability of any protective elements, other surface or air measurements that reveal unusual or high levels of contaminants that are believed to be associated with fires involving the decomposition of lithium-ion battery or related product decontamination products.

(5) Prior experience in being able to successfully remove contaminants by current advanced cleaning procedures from protective elements that have been exposed during fire operations involving a significant content attributable to lithium-ion batteries or related products.

(6) The availability of independent documentation on the demonstrated ability of specific cleaning processes or agents to remove contaminants from protective elements that are associated with fires involving the decomposition of lithium-ion battery or related product decontamination products.

(7) The ability to perform pre- and postfire exposure cleaning to examine the effectiveness of the chosen type of cleaning.

A.6.1.3.5.2

The number and frequency of fire events involving lithium-ion batteries and related devices or facilities, such as mobile and stationary energy storage systems, are increasing. Prior research is showing that many fires involving this type of content can burn faster and hotter through thermal runaways or other unique conditions associated with these materials. While many fires can still be classified as involving products of combustion, the prevalence of possible hazards associated with these fires warrants greater attention by the fire service with respect to how protective ensembles and ensemble elements could be contaminated at the scenes of these fires. One of the key decisions with respect to determining if additional attention should be given for the decontamination of protective ensembles and ensemble elements that these fires is a size-up of the situation where exposure has occurred.

The specific factors identified in determining whether additional decontamination considerations should be applied include the relative content of lithium-ion batteries at the fire location as part of the combustible contents in addition to the length of time and specific activities of firefighters engaged on the fireground. In some cases, an understanding of the specific fire contents in combination with any contamination measurements made during or following the fire can help to inform this decision. Many fires can involve lithium-ion batteries or related products, but not all fire events with these products present require specialized cleaning.

Depending on the types of lithium-ion battery technologies involved, a variety of different decomposition products can be present that involve lithium compounds, hydrogen fluoride, hydrogen cyanide, hydrogen chloride, and various phosphorus and fluorinated compounds that can react with other combustible materials that are present. Known metals, including lithium, cobalt, nickel, and manganese have been characterized at the sites of fires involving lithium-ion battery technology. Therefore, the measurement of these substances at relatively higher levels than normally expected could be an indication that specialized cleaning processes should be applied.

Organizations can further learn from the experience gained from other departments that have either successfully or not successfully applied advanced cleaning, depending on the specific circumstances faced during the specific referenced fires. In addition, some cleaning technologies could present advantages in their overall effectiveness for removing both semivolatile and metal materials that can inform cleaning decisions.

Lastly, those organizations that have access to resources for testing contaminated protective ensemble and ensemble elements both before and after cleaning can obtain information that is also able to allow them to distinguish as to whether the intended advanced cleaning procedures will be effective.

6.1.3.5.2.1

If a decision is made that advanced cleaning is sufficient, the affected ensemble and ensemble elements shall be subject to advanced cleaning as specified in Section 6.3 following the event.

6.1.3.5.2.2

If a decision is made that specialized cleaning is required, the affected ensemble and ensemble elements shall be subject to specialized cleaning as specified in Section 6.5 following the event.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 14:25:13 EDT 2024

Committee Statement

Committee Statement: The proposed section has been added to aid the fire service in making decisions for how to proceed with circumstances where specific contamination from lithium ion battery or mobile and stationary energy storage systems are involved in fires causing exposure of protective ensembles and ensemble element. A key decision for how to proceed is determining whether advanced cleaning is sufficient or if specialized cleaning must be undertaken. Specific advice is provided in the annex to address the factors to be considered in making this decision.

Response Message: SR-106-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

This is an important initial step into energy storage systems contamination. This process will continue to evolve as more data is needed on the levels and effects of the contamination both short and long term.

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 26-NFPA 1850-2024 [Section No. 7.3.7.2]

6.3.7.2*

For advanced cleaning, a mild detergent with a pH range of not less than 6.0 pH and not greater than 9.5 pH undiluted as indicated on the product safety data sheet (SDS)~~, original product container, or a detergent or other cleaning/decontamination product usable in a washer/extractor that is verified to the requirements in Section 11.8 shall~~ or the original product container shall be used.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Thu Aug 15 12:40:50 EDT 2024

Committee Statement

Committee Statement: The verification requirements belong in Chapter 11, not Chapter 7.
Response Message: SR-26-NFPA 1850-2024

Public Comment No. 38-NFPA 1850-2024 [Section No. 7.3.7.2]

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn

Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 27-NFPA 1850-2024 [Section No. 7.3.9.1]

6.3.9.1

Where machine washing with a washer/extractor is specified, the following procedures shall be used:

(1)* The washer/extractor shall not be overloaded or under loaded.

(2)* Heavily soiled or spotted areas shall be pretreated.

(3) All closures, including pocket closures, hooks and loops, snaps, zippers, and hooks and dees, shall be fastened.

(4)* Water temperature shall not exceed 49°C (120°F).

(5)* ~~A water softener shall be considered if water hardness is above~~ Water hardness shall not exceed 60 ppm.

(6)* The specific formulation for the washer/extractor shall include a series of steps for filling the wash basket, adding detergent, performing multiple rinses, and including separate extractions between wash and rinse steps.

(7) The element shall be inspected and rewashed if necessary.

(8)* The washer/extractor shall be routinely cleaned and disinfected.

A.6.3.9.1(8)

Properly cleaning and disinfecting the washer/extractor will prevent contamination build-up and potential cross-contamination between loads. The facility performing cleaning should consider cleaning the washer/extractor between wash loads or, at a minimum, once per day of use.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Thu Aug 15 12:47:32 EDT 2024

Committee Statement

Committee Statement: Stating that a water softener shall be considered is still optional language. This requirement was added during first draft because there was concern that hard water would introduce heavy metal contaminants to the PPE and present health concerns. The revised text now states the water hardness must not exceed 60 ppm. How that is achieved is up to the individual ISPs.

To minimize cross contamination from residue in the washer/extractor to future loads, the washer/extractor must be routinely cleaned and disinfected.

Response Message: SR-27-NFPA 1850-2024

Public Comment No. 5-NFPA 1850-2024 [Section No. 7.3.9.1]

Public Comment No. 82-NFPA 1850-2024 [Section No. 7.3.9.1]

Public Comment No. 65-NFPA 1850-2024 [Section No. 7.3.9.1]

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
22 Affirmative All
5 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McKenna, Michael F.

This paragraph would make more sense if it also included the reference to washing like items together; example separate from liners from outers as shown in NFPA-1851-2020 page 26. Included in the appendix washing liners separate from outer shells should be a requirement. Appendix page 90 N A.7.3.11.2 Ensembles and ensemble elements should be cleaned only with like items, including, but not limited to, outer shells with outer shells, liners with liners, hoods with hoods, gloves with gloves, and footwear with footwear.

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 28-NFPA 1850-2024 [Section No. 7.3.12.1.2]

6.3.12.1.2

Other machine technologies shall be permitted if the type of machine and procedures meet the cleaning verification requirements as specified in 11.3.7 ~~and do not adversely impact garment material performance as specified in Section~~ ~~11.5~~ .

6.3.12.1.3

Optional testing according to Section 11.5 shall be permitted to demonstrate the advanced cleaning procedures do not adversely impact garment material performance.

Supplemental Information

File Name	Description	Approved
1850_SR-28_7.3.12.1.2_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Thu Aug 15 14:43:28 EDT 2024

Committee Statement

Committee Statement: The language as written in 7.3.12.1.2 does not describe how to determine whether or not a process adversely impacts garment material performance and therefore is being stricken. New text in 7.3.12.1.3 indicates that the testing in Section 11.5 may be performed as an option to demonstrate that the cleaning process does not degrade the performance of the materials. This is based on the First Draft Report (FR 159), which indicates that degradation criteria testing is intended to be optional.

Response Message: SR-28-NFPA 1850-2024

Public Comment No. 66-NFPA 1850-2024 [Section No. 7.3.12.1]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 29-NFPA 1850-2024 [Section No. 7.3.13.4]

6.3.13.4*

Unless otherwise specified, helmets shall be hand washed in a utility sink using the following procedures:

(1) The individual washing the helmet shall observe universal precautions and put on a pair of examination gloves, an apron and protective sleeves or coveralls, and a pair of safety glasses or goggles.

(2)* The utility sink shall be filled with warm water at temperature no warmer than ~~40°C (105°F)~~ 49°C (120°F) and a mild detergent having a pH of not less than 6.0 or more than ~~10.5~~ 9.5 ~~at the detergent manufacturer's recommended ratio of detergent to water~~ .

CAUTION: Water at 49°C (120°F) can cause scalding after approximately 4 minutes.

(3) The individual shall use a soft bristle brush to reach between components and scrub both the exterior and interior of the helmet.

(4) The helmet shall be thoroughly rinsed following washing.

(5) Following rinsing, the helmet shall be air dried. It shall be permitted to use a soft towel to aid in drying the helmet after cleaning.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Thu Aug 15 14:50:26 EDT 2024

Committee Statement

Committee Statement: The updated pH and temperature requirements were changed for garment washing in the First Draft, but the remaining ensemble elements were not updated to correlate. This revision aligns the requirements for pH and temperature for helmets.

The effectiveness of contaminant removal at higher temperatures and defined detergent pH has been shown and is justified for the identical changes to advanced cleaning of garments. Conformity with the laundering methods for garments are reasonable considering the materials and components are subject to the same contaminants and are made from materials that can sustain the increase in wash temperature and decrease detergent pH.

Use of hot water at temperatures above 49C (120F) may cause scalding of the skin after approximately 4 minutes of exposure. A caution statement is added to alert the user.

Response Message: SR-29-NFPA 1850-2024

Public Comment No. 41-NFPA 1850-2024 [Section No. 7.3.13.4]

Public Comment No. 12-NFPA 1850-2024 [Section No. 7.3.13.4]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 30-NFPA 1850-2024 [Section No. 7.3.14.2]

6.3.14.2

Unless otherwise specified, gloves shall be hand washed in a utility sink or other container of sufficient size using the following procedures:

(1) The individual washing the gloves shall observe universal precautions and shall put on a pair of examination gloves, an apron and protective sleeves or coveralls, and a pair of safety glasses or goggles.

(2)* The utility sink shall be filled with warm water at temperature no warmer than ~~40°C (105°F)~~ 49°C (120°F) and a mild detergent having a pH of not less than 6.0 or more than ~~10.5~~ 9.5 ~~at the detergent manufacturer's recommended ratio of detergent to water~~ .

CAUTION: Water at 49°C (120°F) can cause scalding after approximately 4 minutes.

(3) The individual shall then don the firefighting gloves over the examination gloves and shall briskly rub the gloves together, ensuring the cleaning of all surfaces. A soft bristle brush shall be permitted to scrub the exterior of the gloves.

(4)* The individual shall then remove the firefighting gloves and refill the utility sink with clean water.

(5) The interior and exterior of the gloves shall be thoroughly rinsed with clean water.

(6) Gloves shall not be wrung out, but instead slightly squeezed to remove excess water.

(7)* Gloves shall be dried using ambient or slightly raised temperatures no warmer than 40°C (105°F). Equipment that provides airflow into the interiors of gloves shall be permitted to aid the faster drying of gloves.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Thu Aug 15 15:13:34 EDT 2024

Committee Statement

Committee Statement: The updated pH and temperature requirements were changed for garment washing in the First Draft, but the remaining ensemble elements were not updated to correlate. This revision aligns the requirements for pH and temperature for gloves.

The effectiveness of contaminant removal at higher temperatures and defined detergent pH has been shown and is justified for the identical changes to advanced cleaning of garments. Conformity with the laundering methods for garments are reasonable considering the materials and components are subject to the same contaminants and are made from materials that can sustain the increase in wash temperature and decrease detergent pH.

Use of hot water at temperatures above 49C (120F) may cause scalding of the skin after approximately 4 minutes of exposure. A caution statement is added to alert the user.

Response Message: SR-30-NFPA 1850-2024

Public Comment No. 13-NFPA 1850-2024 [Section No. 7.3.14.2]

Public Comment No. 42-NFPA 1850-2024 [Section No. 7.3.14.2]

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 33-NFPA 1850-2024 [Section No. 7.3.14.3 [Excluding any Sub-Sections]]

Gloves shall be permitted to be cleaned using alternative cleaning processes, including washer/extractors and other machine-based cleaning~~, if information is available to demonstrate the efficacy of the process for removing contamination and the process does not damage gloves~~ .

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Thu Aug 15 15:30:59 EDT 2024

Committee Statement

Committee Statement: There are no cleaning performance requirements or degradation testing requirements included in the standard to prove cleaning efficacy or damage.
Response Message: SR-33-NFPA 1850-2024 Also see SR-34.

Public Comment No. 69-NFPA 1850-2024 [Sections 7.3.14, 7.3.15]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 31-NFPA 1850-2024 [Section No. 7.3.15.2]

6.3.15.2

Unless otherwise specified, footwear shall be hand washed in a utility sink or other container of sufficient size using the following procedures:

(1) The individual washing the footwear shall observe universal precautions and put on a pair of examination gloves, an apron and protective sleeves or coveralls, and a pair of safety glasses or goggles.

(2)* The utility sink shall be filled with warm water at a temperature no warmer than ~~40°C (105°F)~~ 49°C (120°F) and a mild detergent having a pH of not less than 6.0 or more than 9.5 ~~10.5 at the detergent manufacturer's recommended ratio of detergent to water~~ .

CAUTION: Water at 49°C (120°F) can cause scalding after approximately 4 minutes.

(3)* The individual shall first scrub the interior of the footwear with a soft bristle brush.

(4) The individual shall then scrub the exterior of the footwear with a soft bristle brush, ensuring the cleaning of all exterior surfaces.

(5) The interior and exterior of the footwear shall be thoroughly rinsed with clean water.

(6)* In the absence of specialized drying equipment, the footwear shall be suspended upside down to dry, with attention that water runoff does not create a slip hazard.

(7) If specified by the manufacturer, a sealant, conditioning, or polish shall be applied to leather footwear after the footwear has completely dried.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Thu Aug 15 15:16:19 EDT 2024

Committee Statement

Committee Statement: The updated pH and temperature requirements were changed for garment washing in the First Draft, but the remaining ensemble elements were not updated to correlate. This revision aligns the requirements for pH and temperature for footwear.

The effectiveness of contaminant removal at higher temperatures and defined detergent pH has been shown and is justified for the identical changes to advanced cleaning of garments. Conformity with the laundering methods for garments are reasonable considering the materials and components are subject to the same contaminants and are made from materials that can sustain the increase in wash temperature and decrease detergent pH.

Use of hot water at temperatures above 49C (120F) may cause scalding of the skin after approximately 4 minutes of exposure. A caution statement is added to alert the user.

Response Message: SR-31-NFPA 1850-2024

Public Comment No. 43-NFPA 1850-2024 [Section No. 7.3.15.2]

Public Comment No. 14-NFPA 1850-2024 [Section No. 7.3.15.2]

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 34-NFPA 1850-2024 [Section No. 7.3.15.3 [Excluding any Sub-Sections]]

Footwear shall be permitted to be cleaned using alternative cleaning processes, including different forms of machine-based cleaning~~, if information is available to demonstrate the efficacy of the process for removing contamination and the process does not damage footwear~~ .

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Thu Aug 15 15:32:37 EDT 2024

Committee Statement

Committee Statement: There are no cleaning performance requirements or degradation testing requirements included in the standard to prove cleaning efficacy or damage.
Response Message: SR-34-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn

Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 32-NFPA 1850-2024 [Section No. 7.3.16.5]

6.3.16.5

Where hoods are subjected to hand cleaning and unless otherwise specified, hoods shall be hand washed in a utility sink or other container of sufficient size using the following procedures:

(1) The individual washing the hood shall observe universal precautions and put on a pair of examination gloves, an apron and protective sleeves or coveralls, and a pair of safety glasses or goggles.

(2) The utility sink shall be filled with warm water at temperature no warmer than ~~40°C (105°F)~~ 49°C (120°F) and a mild detergent having a pH of not less than 6.0 or more than ~~10.5~~ 9.5 ~~at the detergent manufacturer's recommended ratio of detergent to water~~ .

CAUTION: Water at 49°C (120°F) can cause scalding after approximately 4 minutes.

(3) After allowing the hood to presoak for a period of at least 10 minutes, the individual shall lightly rub the hood material together, starting with the exterior and then turning the hood inside out and similarly rubbing the material against itself. A soft wash cloth shall be permitted for washing the hoods.

(4) Stretching or wringing the hood out shall be avoided during hand washing.

(5) The hood shall be thoroughly rinsed following washing.

(6) Following rinsing, if using air drying, the hood shall be air dried by laying on a drying rack or other surface that helps promote draining of water from the hood.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Thu Aug 15 15:17:49 EDT 2024

Committee Statement

Committee Statement: The updated pH and temperature requirements were changed for garment washing in the First Draft, but the remaining ensemble elements were not updated to correlate. This revision aligns the requirements for pH and temperature for hoods.

The effectiveness of contaminant removal at higher temperatures and defined detergent pH has been shown and is justified for the identical changes to advanced cleaning of garments. Conformity with the laundering methods for garments are reasonable considering the materials and components are subject to the same contaminants and are made from materials that can sustain the increase in wash temperature and decrease detergent pH.

Use of hot water at temperatures above 49C (120F) may cause scalding of the skin after approximately 4 minutes of exposure. A caution statement is added to alert the user.

Response Message: SR-32-NFPA 1850-2024

Public Comment No. 15-NFPA 1850-2024 [Section No. 7.3.16.5]

Public Comment No. 44-NFPA 1850-2024 [Section No. 7.3.16.5]

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 74-NFPA 1850-2024 [Section No. 8.1.4]

8.1.4*

All repairs and alterations to the ensemble or ensemble element shall be done in a manner and using like materials and components that are compliant with ~~NFPA 1971 , incorporated in the 2024 edition of NFPA 1970~~ NFPA 1970 (1971) .

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Sat Aug 17 01:32:36 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

Response Message: SR-74-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 75-NFPA 1850-2024 [Section No. 8.2.3.3]

8.2.3.4

Where tears, holes, or abrasions are being repaired, the damaged areas shall be mended using flame-resistant (FR) thread that is compliant with ~~NFPA 1971 , incorporated in the 2024 edition of NFPA 1970~~ NFPA 1970 (1971) , to prevent further damage prior to application of the patch.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Sat Aug 17 01:42:12 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

Response Message: SR-75-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 127-NFPA 1850-2024 [Section No. 9.1.1.1]

9.1.1.1

The ~~organization's PPE technician(s)~~ PPC manager shall be responsible for managing the proper storage of PPE, including warehouse storage as well as in-station/in-service storage.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Wed Sep 11 15:20:36 EDT 2024

Committee Statement

Committee Statement: In the First Draft, the committee added text based on a single position for a PPE Technician. It has been divided into two separate positions - Manager and Technician - to separate the responsibilities of overseeing the entire lifecycle of the gear from the task-based work of maintaining the gear. The descriptor "PPE" is changed to "PPC" to clarify that this manager/technician does not maintain other types of PPE, such as respiratory protection equipment. The intended scopes of responsibility and training for these positions will be addressed in definitions and new Annex E. Since the program establishes that the PPC manager oversees the entire program, it is sufficient to refer to the “organization” for most requirements.

These changes are applied in SR-69 (Chapter 4), SR-123 (Chapter 5), SR-124 (Chapter 6), SR-125 (Chapter 7), SR-126 (Chapter 8), SR-127 (9.1.1.1), SR-128 (Chapter 10), and SR-129 (Chapter 11).

Response Message: SR-127-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert

McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 35-NFPA 1850-2024 [Section No. 9.2.3 [Excluding any Sub-Sections]]

Contaminated or soiled clothing shall not be transported or staged in the cab of fire department apparatus ~~when not being worn for operational duties~~ unless placed in an airtight protective case or bag to prevent cross contamination.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Thu Aug 15 15:43:14 EDT 2024

Committee Statement

Committee Statement: This article is specific to the 'transport' and 'staging' of contaminated PPE within apparatus cabs. There are no reasonable "operational duties" of an emergency nature that would necessitate to wearing of contaminated turnout gear for the purpose of transport or staging. There are many provisions and operational logistics that can be implemented to accommodate fire fighters once their PPE is contaminated.

Response Message: SR-35-NFPA 1850-2024

Public Comment No. 16-NFPA 1850-2024 [Section No. 9.2.3 [Excluding any Sub-Sections]]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 36-NFPA 1850-2024 [Section No. 11.1.1.1 [Excluding any Sub-Sections]]

Verification of the organization or ISP shall include advanced inspection, advanced cleaning, sanitization, and advanced repairs of garment elements only as specified in Table 11.1.1.1.

Table 11.1.1.1 ISP and Organization Verification Designation Criteria

Function/Capability	Verified ISP or Verified Organization	Verified Cleaner
Advanced cleaning	Required	Required
Heavy metals cleaning efficiency	~~≥70~~ 50 % for average of all metals	~~≥70~~ 50 % for average of all metals
Semivolatile organic compound cleaning efficiency	~~≥70~~ 50 % for average of all compounds	~~≥70~~ 50 % for average of all compounds
Biological sanitization effectiveness — *Staphylococcus aureus*	3 log reduction or better	3 log reduction or better
Biological sanitization effectiveness — *Klebsiella pneumoniae*	3 log reduction or better	3 log reduction or better
Advanced inspection	All ensembles and ensemble elements of structural and proximity firefighter protective clothing	Not allowed
Advanced repair	~~All ensembles and ensemble elements capable of being repaired for structural and proximity firefighter protective clothing that they have been specifically verified to repair~~ At a minimum for verification of advanced repairs, repair of outer shells and thermal barriers is required	No repairs allowed
Advanced repairs for moisture barriers	ISPs have a choice of which moisture barriers to verify	Not allowed
~~Verification testing timing~~	~~Every two years, or when processes change~~	~~Every two years, or when processes change~~
~~Verification facility quality review and inspection~~	~~Every six months~~	~~Every six months~~

Supplemental Information

File Name	Description	Approved
1850_SR-36_11.1.1.1_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 09:39:54 EDT 2024

Committee Statement

Committee Statement: There is preliminary data that suggest a higher cleaning efficiency is possible, but the data are insufficient at this time. There is ongoing research into the robustness of the efficiency test method, the development of meaningful test criteria, and the development of advanced cleaning methods. The committee created a task group to collect research on this topic. When data is available, the committee will act to increase the minimum cleaning efficiency. The task group is asked to provide a report no later than August 2025.

This change updates the text for advanced repairs to indicate that only outer shells and thermal barriers are required. No other ensemble elements are considered within this verification chapter and therefore it is inappropriate to state that they should be required. Also, the verification timeline is removed from this table since it is being moved to a new table under 11.2.12.

Response Message: SR-36-NFPA 1850-2024

Public Comment No. 36-NFPA 1850-2024 [Section No. 11.1.1.1 [Excluding any Sub-Sections]]

Public Comment No. 25-NFPA 1850-2024 [Global Input]

Public Comment No. 57-NFPA 1850-2024 [Section No. 11.1.1.1 [Excluding any Sub-Sections]]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
1 Affirmative with Comments
2 Negative with Comments
1 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Stull, Jeffrey O.

Agree

Negative with Comment

McMillan, Neil

70% cleaning efficacy is achievable by ISPs and departments. Currently there is no ISP who sought ISP cleaning verification who has not received it, because a 50% cleaning efficacy requirement is too low. Little meaning comes from a cleaning validation, if there are no applicants who have been unable to achieve certification. It is also recognized that the phthalates added to the contamination removal testing artificially skews the figures upwards, further necessitating the requirement for an increase from 50% cleaning, to achieve a meaningful certification.

Reidy, Jim

Even though we are researching on the efficiency and doping concentrations, we should have moved the needle north, if only only by a small percentage.

Abstention

Cinque, Vince

As stated in SR-102 comment: I believe it is a mistake to not endeavor to increase the cleaning effectiveness measurements for our firefighters. Contaminants and exposures continue to increase and remaining stagnate on the current requirement for another 5 years is inconsistent with the technical committee's responsibilities for end user health and safety. When the task group acquires the necessary data to support an increase in cleaning effectiveness, I will support the increase.

Second Revision No. 37-NFPA 1850-2024 [Section No. 11.1.1.5.3]

11.1.1.5.3*

The listing for advanced cleaning and sanitization verification services shall include the following:

(1) A generic description of the type of ~~advanced cleaning equipment, supplies, and process used, including any pretreatments and additional treatments that are always used as part of the~~ advanced cleaning process.

(2) A generic description of the type of ~~sanitization equipment, supplies, and process used, including any pretreatments and additional treatments that are always used as part of the~~ sanitization process.

(3) The average cleaning efficiency for the removal of ~~heaving metals~~ all heavy metals and the average for each heavy metal .

(4) The average cleaning efficiency for the removal of all semivolatile organic compounds and each semivolatile organic compound .

(5) The biological sanitization effectiveness for *Staphylococcus aureus*.

(6) The biological sanitization effectiveness for *Klebsiella pneumoniae*.

(7) The dates that the reports for the verification of advanced cleaning and sanitization were issued.

A.11.1.1.5.3

The descriptions for the types of equipment and processes used in advanced cleaning and sanitization used in the verification of a specific facility are intended to provide general information about the major equipment and process used for the verification that is supposed to be consistently applied whenever advanced cleaning or sanitization is undertaken for fire departments or other customers. This information is not intended to reveal any ~~priority~~ proprietary information about a specific facility's operations.

Examples for identifying equipment in meeting these requirements include washer/extractor and specialized machines for liquid carbon dioxide dry cleaning.

An example for identifying supplies is a proprietary detergent.

Examples for identifying pretreatments and other treatments include use of a soak tank with detergent, and an additional soak cycle for washer/extractor and ozone.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 10:14:36 EDT 2024

Committee Statement

Committee Statement: Items (1) and (2) are revised because it is not common or necessary to include process details on a verification listing. This type of information is included in the verification report which can be available upon request.

Items (3) and (4) are revised to require the cleaning efficiencies for individual heavy metals and SVOCs to be included in the listing, so that fire departments have access to this information for comparison.

The annex is revised to correct a typo.

Response Message: SR-37-NFPA 1850-2024

Public Comment No. 73-NFPA 1850-2024 [Section No. 11.1.1.5.3]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 38-NFPA 1850-2024 [Section No. 11.1.1.5.4]

~~11.1.1.5.4~~

~~Repair categories shall be garment outer shell repairs, garment moisture barrier repairs, and garment thermal barrier repairs.~~

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 10:51:10 EDT 2024

Committee Statement

Committee Statement: The deleted text was a duplicate of 11.1.1.5.2.
Response Message: SR-38-NFPA 1850-2024

Public Comment No. 34-NFPA 1850-2024 [Section No. 11.1.1.5.4]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan

Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 39-NFPA 1850-2024 [Section No. 11.1.1.6]

11.1.1.6

Where the certification listing includes the moisture barrier repair category, the listing shall include the moisture barrier manufacturer and ~~moisture barrier family designation that includes which moisture barriers are included in~~ the ~~family, and the~~ repair tape manufacturer and trade name or part number.

~~**11.1.1.6.1***~~

~~The moisture barrier family designation shall be provided to the certification organization by the moisture barrier manufacturer.~~

~~**A.11.1.1.6.1**~~

~~The moisture barrier family designation allows the grouping of multiple moisture barriers by the same manufacturer based on the identical repair tape and identical repair process for a given family of moisture barriers. Only the designated moisture barrier family is certified instead of each individual moisture barrier trade name.~~

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 10:52:47 EDT 2024

Committee Statement

Committee Statement: New moisture barriers are being introduced into the market, and their similarities for repair are unknown. Allowing for one material to be tested to represent another could lead to unintended consequences. Additionally, allowing for moisture barrier families will lead to confusion in the industry on which materials are actually tested.

Response Message: SR-39-NFPA 1850-2024

Public Comment No. 33-NFPA 1850-2024 [Section No. 11.1.1.6]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 40-NFPA 1850-2024 [Section No. 11.1.1.7]

11.1.1.7

Where the verified ISP or verified cleaner is mobile, the physical address ~~of where the mobile facility performs the services or~~ for the mobile facility's base of operations and a unique identifier shall be listed on the certification organization's website.

11.1.1.7.1

~~If a unique identifier is used to distinguish the mobile facility, the identifier shall be clearly posted on the mobile facility and match the identifier that is listed on the certification organization's website.~~ The following information shall be posted on the mobile facility where it is viewable and accessible to the fire service:

(1) The unique identifier from the listing

(2) Serial number

(3) Certificate of verification

(4) Listing as verified ISP or verified cleaner

(5) Company information

~~**A.11.1.1.7.1**~~

~~The unique identifier for mobile units shall be easily viewed and accessible to the fire service. The unit should have the following information viewable and available to easily identify the verification category and the certification date:~~

~~Serial number~~

~~Annual test certificate~~

~~Listing as verified ISP or verified cleaner~~

~~Company information~~

Supplemental Information

File Name	Description	Approved
1850_SPF_SR40_11.1.1.7.docx	staff use	
1850_SR-40_11.1.1.7_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 11:13:55 EDT 2024

Committee Statement

Committee Statement: Mobile facilities perform services at many different locations, and having the location where they perform services wouldn't be appropriate. The intent is to identify their base of operations, which affects important characteristics and ties them to the quality manual.

Because a base of operations can have multiple trucks, it is necessary to also require a unique identifier for all mobile facilities to distinguish between them. The list of items to be posted on the truck has been moved from the annex to the mandatory requirements to ensure transparency.

Response Message: SR-40-NFPA 1850-2024

Public Comment No. 4-NFPA 1850-2024 [Section No. 11.1.1.7 [Excluding any Sub-Sections]]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 41-NFPA 1850-2024 [Sections 11.1.4, 11.1.5]

11.1.4

The certification organization shall not issue any ~~new~~ verifications to the 2020 edition of NFPA 1851 on or after the NFPA effective date ~~for the 2025~~ of this edition of ~~NFPA 1850 (1851)~~ this standard .

~~**11.1.5**~~

~~Organizations, ISPs, or manufacturers verified to the 2020 edition of NFPA 1851 shall undergo verification to the 2025 edition of NFPA 1850 (1851) within 12 months of the NFPA effective date for the 2025 edition.~~

Supplemental Information

File Name	Description	Approved
1850_SPF_SR41_11.1.4-11.1.5.docx	staff use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 11:43:53 EDT 2024

Committee Statement

Committee Statement: Verification within this standard is based on a 2-year cycle. If the 12-month implementation period were to remain, many ISPs would need to perform testing at nearly the same time, and the same backlog would occur every two years after that. By removing the implementation time altogether, this allows the ISPs to maintain their certificate until it expires. If that expiration date falls after the issuance date of this edition of NFPA 1850 (1851), then the new verification will be performed according to the new standard.

Response Message: SR-41-NFPA 1850-2024

Public Comment No. 45-NFPA 1850-2024 [Sections 11.1.4, 11.1.5]

Public Comment No. 61-NFPA 1850-2024 [Section No. 11.1.5]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 42-NFPA 1850-2024 [Section No. 11.2.12]

11.2.12*

The certification organization shall have a follow-up inspection program of the facilities of the compliant services with ~~at least one random and~~ unannounced visits in accordance with Table 11.2.12.

Table 11.2.12 Follow-Up Program Schedule

Time Since Previous Verification Testing	Verification Task	Method of Verification
6 months	Quality review and inspection	On-site visit or virtual inspection
12 months	Quality review and inspection	On-site visit
18 months	Quality review and inspection	On-site visit or virtual inspection
24 months	Verification testing	On-site visit with additional virtual inspections, as needed

11.2.12.1

The certification organization shall be permitted to perform additional quality review and inspection at random, unannounced intervals.

Supplemental Information

File Name	Description	Approved
1850_SPF_SR42_11.2.12.docx	staff use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 11:55:10 EDT 2024

Committee Statement

Committee Statement: Historically, this standard has not been clear on whether or not virtual inspections are allowed. Since the 2020 edition of the standard was issued the same year that the pandemic started, the certification and testing laboratories had to rely on virtual witnessing. After the pandemic ended, questions about returning to in-person and onsite visits were raised. The new table intends to provide clarity to how those inspections should occur.

The ability to perform additional, random, unannounced visits was moved to a separate requirement to separate these optional visits from the scheduled visits required by the table.

Response Message: SR-42-NFPA 1850-2024

Public Comment No. 35-NFPA 1850-2024 [Section No. 11.2.12]

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 43-NFPA 1850-2024 [Section No. 11.3.6]

11.3.6

Sampling levels for testing and inspection shall be established by the certification organization and the organization or the ISP to ensure reasonable and acceptable reliability at a reasonable and acceptable confidence level that cleaning and repair services are compliant to this standard, unless such sampling levels are specified herein.

11.3.6.1

Where an organization, ISP, or manufacturer operates multiple facilities in different locations, each separate location shall be subject to verification.

11.3.6.2*

For the purpose of verification of advanced cleaning and sanitization, the certification organization shall ~~review the respective facility to~~ determine the equipment and procedures that, through engineering judgment, will result in the lowest level of cleaning. ~~The equipment and procedures shall be selected and subjected to the verification procedures in 11.3.7 .~~

11.3.6.3*

The equipment and procedures ~~shall be selected and~~ subjected to the verification procedures in 11.3.7 shall not include the procedures utilized by the organization or ISP for specialized cleaning as determined by a review of the organization or ISP quality manual .

A.11.3.6.3

Organizations and ISPs perform specialized cleaning only when advanced cleaning is not adequate. Many of the techniques utilized by organizations or ISPs for specialized cleaning include extended soaking or scrubbing in a specific area of the garment. The purpose of the verification procedures in 11.3.7 is to verify whether a standard advanced cleaning process utilized by the organization or ISP is effective.

Supplemental Information

File Name	Description	Approved
1850_SR-43_11.3.6_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 12:15:18 EDT 2024

Committee Statement

Committee Statement: The purpose of cleaning verification in this standard is to determine whether or not the ISP has adequate advanced cleaning procedures. Techniques used within specialized cleaning are inappropriate to use for this testing as they would not be employed on a standard day-to-day basis. They would also not be adequate to consider whether the entire garment is cleaned since many of the specialized cleaning procedures are targeted towards a specific contaminant or location on the garment.

Response Message: SR-43-NFPA 1850-2024

Public Comment No. 55-NFPA 1850-2024 [Section No. 11.3.6]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 55-NFPA 1850-2024 [Section No. 11.3.7.1]

Detail SR-102

11.3.7.1*

The cleaning process shall demonstrate a ~~70~~50 percent or greater average cleaning efficiency for the average of all semivolatile organic compounds and the average of all heavy metals separately.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 16:06:05 EDT 2024

Committee Statement

Committee Statement: There is preliminary data that suggest a higher cleaning efficiency is possible, but the data are insufficient at this time. There is ongoing research into the robustness of the efficiency test method, the development of meaningful test criteria, and the development of advanced cleaning methods. The committee created a task group to collect research on this topic. When data is available, the committee will act to increase the minimum cleaning efficiency. The task group is asked to provide a report no later than August 2025.

Response Message: SR-55-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
1 Affirmative with Comments
2 Negative with Comments
1 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Stull, Jeffrey O.

Agree

Negative with Comment

McMillan, Neil

70% cleaning efficacy is achievable by ISPs and departments. Currently there is no ISP who sought ISP cleaning verification who has not received it, because a 50% cleaning efficacy requirement is too low. Little meaning comes from a cleaning validation, if there are no applicants who have been unable to achieve certification. It is also recognized that the phthalates added to the contamination removal testing artificially skews the figures upwards, further necessitating the requirement for an increase from 50% cleaning, to achieve a meaningful certification.

Reidy, Jim

Again, we should have moved the needle some fashion.

Abstention

Cinque, Vince

As stated in SR-102 comment: I believe it is a mistake to not endeavor to increase the cleaning effectiveness measurements for our firefighters. Contaminants and exposures continue to increase and remaining stagnate on the current requirement for another 5 years is inconsistent with the technical committee's responsibilities for end user health and safety. When the task group acquires the necessary data to support an increase in cleaning effectiveness, I will support the increase.

Second Revision No. 44-NFPA 1850-2024 [Section No. 11.3.7.3]

11.3.7.3*

For verification of cleaning, water hardness testing shall be performed by the ISP, the cleaner only, the manufacturer, or the organization and shall not exceed 60 ppm.

A.11.3.7.3

Water hardness can be performed in a number of ways, including the use of test strips that indicate a water hardness range that falls below the requirement or laboratory testing that provides an actual water hardness value. Any method used should indicate that the water falls below the requirement, whether or not an exact value or range is provided.

11.3.7.3.1

The facility shall perform water hardness testing a minimum of every two years.

11.3.7.3.2

Where the facility is mobile, the facility shall test water hardness prior to performing any services at each remote location.

11.3.7.3.3

Where the facility is mobile, the facility shall be permitted to use water from a location where that location is tested and complies with 11.3.7.3.1.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 12:24:13 EDT 2024

Committee Statement

Committee Statement: Annex material is added to clarify that any method for measuring water hardness is appropriate and that certification organizations can interpret how to meet this requirement.

Response Message: SR-44-NFPA 1850-2024

Public Comment No. 26-NFPA 1850-2024 [Section No. 11.3.7.3]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments

0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 45-NFPA 1850-2024 [Section No. 11.3.8.2]

11.3.8.2

For moisture barrier pinhole repairs, the certification organization shall inspect the pinholes in the material(s) to be repaired and shall witness the repair of the samples to be tested. The pinholes shall be created in the material(s) by using a size 8 gauge sewing needle to completely puncture the moisture barrier five times in a 25 mm (1 in.) square located in the center of a ~~152~~ 203 mm × ~~152~~ 203 mm (~~6~~ 8 in. × ~~6~~ 8 in.) sample. The 25 mm (1 in.) square shall be clearly marked to identify the damaged area.

11.3.8.2.1

The damaged and repaired samples specified in 11.3.8.1 and 11.3.8.2 shall be prepared for the conditioning specified in Table 11.3.8(c).

11.3.8.2.2

Samples for conditioning shall consist of a composite constructed using a layer of 3.8 oz/yd^2 ± 0.3 oz/yd^2 aramid needle-punched nonwoven material, quilted to 3.4 oz/yd^2 ± 0.2 oz/yd^2 aramid woven plain weave thermal barrier material, and the repaired moisture barrier layer. The two-layer composite shall be stitched around the entire periphery in the orientation used in a garment.

11.3.8.2.3

The moisture barrier layer shall be removed from the two-layer composite samples after all conditioning has been completed and shall become the moisture barrier specimen.

11.3.8.2.4

Testing shall be performed as specified in Section 13.3.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 12:27:36 EDT 2024

Committee Statement

Committee Statement: During first draft, this section was updated to reduce the sample size. After discussion with the lab, it was determined that this was a little too small for testing and the additional two inches in each direction will be sufficient to make sure that there is enough of an edge around the test area.

Response Message: SR-45-NFPA 1850-2024

Public Comment No. 28-NFPA 1850-2024 [Section No. 11.3.8.2 [Excluding any Sub-Sections]]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters

6 Not Returned

23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed

McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 46-NFPA 1850-2024 [Section No. 11.3.10]

11.3.10

For verification of the advanced cleaning and sanitization services of ISPs, cleaners, manufacturers, or organizations, the documentation and measurements specified in Table 11.3.10 shall be evaluated for compliance by the certification organization.

Table 11.3.10 Advanced Cleaning Evaluation

NFPA 1850 Clause to Be Evaluated	Method of Evaluation
7.3.4	Audit or review of procedures and documentation by certification organization
7.3.4.2	Audit or review of procedures and documentation by certification organization
7.3.5	Audit or review of procedures and documentation by certification organization
7.3.6	Audit or review of procedures and documentation by certification organization
7.3.7.2	Audit or review of procedures and documentation by certification organization
7.3.8	Audit or review of procedures and documentation by certification organization
7.3.9(1)–(3) and 7.3.9(5)–(6)	Audit or review of procedures and documentation by certification organization
7.3.9(4)	Direct measurement or observation by a representative of the certification organization
7.3.11	Audit or review of procedures and documentation by certification organization
7.3.16	Audit or review of procedures and documentation by certification organization
7.3.10	Audit or review of procedures and documentation by certification organization
7.3.10.1(1)(c), 7.3.10.1(2)(c), or 7.3.10.1(3)(d)	Direct measurement or observation by a representative of the certification organization
7.4.4.3	Audit or review of procedures and documentation by certification organization
7.4.4.4	Audit or review of procedures and documentation by certification organization
7.4.4.5	Audit or review of procedures and documentation by certification organization
7.4.4.6	Audit or review of procedures and documentation by certification organization
11.3.7.3	Direct measurement or observation by a representative of the certification organization
11.3.7.5	Audit or review of procedures and documentation by certification organization

Supplemental Information

File Name	Description	Approved
1850_SPF_SR46_11.3.10.docx	staff use	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 14:51:23 EDT 2024

Committee Statement

Committee Statement: While the requirement to perform the water hardness testing is present in 11.3.7.3, this adds clarity to the requirement for the certification organizations and what is required for documentation purposes.

Response Message: SR-46-NFPA 1850-2024

Public Comment No. 27-NFPA 1850-2024 [Section No. 11.3.10]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 47-NFPA 1850-2024 [Section No. 11.5]

11.5 Evaluation of Cleaning Process Impact on Protective Garments.

Where specified or where undertaken as an optional evaluation, advanced cleaning procedures shall be evaluated for their impact on key performance properties as specified in Section ~~12.14~~ 13.5, where the measured performance of each garment material property is in accordance with the criteria specified in the requirements of NFPA 1970 (1971).

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 14:53:46 EDT 2024

Committee Statement

Committee Statement: This revision corrects the cross-reference to the correct test procedure.
Response Message: SR-47-NFPA 1850-2024

Public Comment No. 67-NFPA 1850-2024 [Section No. 11.5]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.

Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
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Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 64-NFPA 1850-2024 [Section No. 11.6]

11.6 Optional Verifications for Contaminant Removal.

11.6.1 Advanced Cleaning and Sanitization Verification for Garment Outer Shells, Moisture Barriers and Thermal Barriers.

Where undertaken, selected outer shell, moisture material, and thermal barrier materials shall be evaluated for both advanced cleaning and sanitization efficacy as specified in Section 13.6 and meet the criteria in 11.6.1.1 and 11.6.1.2.

11.6.1.1

The cleaning process shall provide a ~~70~~ 50 percent or greater average cleaning efficiency for the average of all semivolatile organic compounds and the average of all surrogate heavy metal contaminants, separately.

11.6.1.2

The sanitization process shall provide for at least a $\log_{10}3$ reduction of each challenge microorganism.

11.6.2 Advanced Cleaning and Sanitization Verification of Protective Hoods.

Where undertaken, hoods shall be evaluated for both advanced cleaning and sanitization efficacy as specified in Section 13.7 and meet the criteria in 11.6.2.1 and 11.6.2.2.

11.6.2.1

The cleaning process shall provide a ~~70~~ 50 percent or greater average cleaning efficiency for the average of all semivolatile organic compounds and the average of all surrogate heavy metal contaminants, separately.

11.6.2.2

The sanitization process shall provide for at least a $\log_{10}3$ reduction of each challenge microorganism.

11.6.3 Advanced Cleaning Verification for Removal of Additional PAHs from Garments.

Where undertaken, garment outer shell materials shall be evaluated for advanced cleaning efficacy in removing PAH contamination as specified in Section 13.8 where the cleaning process provides a ~~70~~ 50 percent or greater average cleaning efficiency for the average of all PAH compounds.

11.6.4 Advanced Cleaning Verification for Removal of Semivolatile PFAS from Garments.

Where undertaken, garment outer shell materials shall be evaluated for advanced cleaning efficacy in removing PFAS contamination as specified in Section 13.9 where the cleaning process provides a ~~70~~ 50 percent or greater average cleaning efficiency for the average of all PFAS compounds.

11.6.5 Advanced Cleaning Verification for Removal of Mobile and Stationary Energy Storage System Fire Decomposition Products from Garments. (Reserved)

~~Where undertaken, garment outer shell materials shall be evaluated for advanced cleaning efficacy in removing mobile and stationary energy storage system fire decomposition product contamination as specified in Section 12.10 where the cleaning process provides a 70 percent or greater average cleaning efficiency for the average of all target surrogate compounds.~~

11.6.6* Advanced Cleaning Verification for Removal of Asbestos from Garments.

Where testing is undertaken to support the decision for whether protective ensembles or ensemble elements can be subject to advanced or specialized cleaning for the removal of asbestos , ~~garment outer shell materials~~ representative ensemble elements shall be evaluated for ~~advanced cleaning efficacy in removing~~ asbestos fiber contamination as specified in Section 13.11 ~~where the cleaning process removes asbestos fibers to a level below the detection limit~~ .

A.11.6.6

While there are no established permissible levels of asbestos fibers on protective element surfaces, the acceptability for a protective element to be free of asbestos contamination is often taken as results showing the absence of asbestos fibers or no greater than background levels of asbestos that can be considered to be common in the environment. Also see A.6.5.4.5 .

11.6.7 Advanced Cleaning Verification for Removal of Fireground Contamination from Small Scale Burn Tests. (Reserved)

Supplemental Information

File Name	Description	Approved
1850_SPF_SR64_11.6.docx	staff use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 22:55:52 EDT 2024

Committee Statement

Committee Statement: In 11.6.1 through 11.6.4, the efficiency criteria are changed to 50%. There is preliminary data that suggest a higher cleaning efficiency is possible, but the data are insufficient at this time. There is ongoing research into the robustness of the efficiency test method, the development of meaningful test criteria, and the development of advanced cleaning methods. The committee created a task group to collect research on this topic. When data is available, the committee will act to increase the minimum cleaning efficiency. The task group is asked to provide a report not later than August 2025.

Sections 11.6.5 is deleted and reserved because these requirements are still in development.

Section 11.6.6 is revised. Viable industry practice and annex information in the prior edition of NFPA 1851 have established suitable non-destructive procedures for evaluating if protective elements have asbestos contamination. This annex information has been moved into the optional verifications as part of Section 11.6.6 for establishing where asbestos contamination is present on a protective element that can then inform decisions whether contamination is present and if cleaning is effective using methodology provided in Section 12.11. A new section 7.1.3.3.2.3 has been established to point to how testing must be performed if part of the decision process for decided to decontaminate protective elements suspected or known to be contaminated with asbestos.

Section 11.6.7 is added and reserved. Research has advanced small scale fireground procedures that are becoming more consistent in imparting contamination from specified fuel loads to protective element samples. This approach offers the ability to better simulate fireground exposures in the manner in which contamination of firefighter protective ensembles and ensemble elements than currently undertaken in the by principal current cleaning verification practices. Such practices provide for potential

customization of the contamination sources that can then provide relevant data to inform decisions for appropriate cleaning approaches and their effectiveness.

Response Message: SR-64-NFPA 1850-2024

Public Comment No. 39-NFPA 1850-2024 [Sections 11.6.5, 11.6.6]

Public Comment No. 74-NFPA 1850-2024 [Section No. 11.6]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
3 Affirmative with Comments
0 Negative with Comments
1 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
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Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

McMillan, Neil

70% cleaning efficacy is achievable by ISPs and departments. Currently there is no ISP who sought ISP cleaning verification who has not received it, because a 50% cleaning efficacy requirement is too low. Little meaning comes from a cleaning validation, if there are no applicants who have been unable to achieve certification. It is also recognized that the phthalates added to the contamination removal testing artificially skews the figures upwards, further necessitating the requirement for an increase from 50% cleaning, to achieve a meaningful certification.

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Abstention

Cinque, Vince

Please see previous comments in SR-102 and SR-55

Second Revision No. 48-NFPA 1850-2024 [New Section after 12.1.6]

13.1.6.1

The organization or PPC manager shall establish parameters to determine if the amount of light transmittance requires retirement of the hood.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 15:07:42 EDT 2024

Committee Statement

Committee Statement: The test includes a subjective determination for the amount of light that is permissible. Without quantitative measurements, the organization or PPC manager must determine what is acceptable in accordance with its hazard/risk profile.

Response Message: SR-48-NFPA 1850-2024

Public Comment No. 59-NFPA 1850-2024 [Sections 12.1.5, 12.1.6]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

Something should be added to an annex to indicate the relationship of size of hole to percentage of contamination leakage.

Stull, Jeffrey O.

Agree

Second Revision No. 93-NFPA 1850-2024 [Section No. 12.4.3.1]

13.4.3.1

The garment outer shell used for specimens shall be an undyed (gold) 60 percent para-aramid/40 percent polybenzimidazole (PBI) base fabric in a 2x1 twill – 33 percent filament/67 percent spun combination construction – with a non-PFAS finish meeting the following specifications:

(1) The outer shell fabric shall have a unit area weight of 240 ± 5 percent g/m^2 (7.1 ± 5 percent to 7.9 oz/yd^2).

(2) The outer shell fabric shall have a thickness of 0.40 ± 0.05 mm (0.016 ± 0.002 in.).

(3) The outer shell fabric shall have a water absorption resistance of 5 ± 3 percent when tested in accordance with ~~Section 8.25~~ 9.4.1 of NFPA 1970.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Tue Sep 03 15:30:16 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The section number of the water absorption resistance test was changed in the Second Draft of NFPA 1970.

Response Message: SR-93-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 49-NFPA 1850-2024 [Section No. 12.4.5.1]

13.4.5.1

Each individual contaminated and non- contaminated specimen shall be placed in a ~~separate~~ contamination-free or sterile container ~~with a label identifying the specimen and shipped overnight by the certification organization or its designated laboratory to the cleaning facility for receipt on the scheduled day of testing~~ or package so that each contaminated specimen is isolated from the other and the noncontaminated specimens are in a separate container or package .

13.4.5.2

The specimens shall be shipped ~~overnight~~ by the certification organization or its designated laboratory to the cleaning facility for receipt on the scheduled day of testing.

Supplemental Information

File Name	Description	Approved
1850_SR-49_12.4.5.1_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 15:13:30 EDT 2024

Committee Statement

Committee Statement: The packaging requirements are updated so that multiple contaminated specimens can be combined into a single package as long as that packaging ensures isolation between specimens. This provides more flexibility. The ability to separate samples is not an issue.

The requirement that shipments must be delivered overnight is removed. There are packaging options that are capable of maintaining proper conditions for longer periods of time.

Response Message: SR-49-NFPA 1850-2024

Public Comment No. 37-NFPA 1850-2024 [Section No. 12.4.5.1]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments

0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 52-NFPA 1850-2024 [Section No. 12.4.7.2]

13.4.7.2

Specimens shall be shipped ~~in a manner to maintain their temperature at~~ with packaging that maintains a temperature of no higher than 4°C (39°F) after testing at the cleaning facility.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 15:47:58 EDT 2024

Committee Statement

Committee Statement: This revision adds a tolerance to the temperature specification because it is unreasonable to expect an exact temperature to be maintained.

Response Message: SR-52-NFPA 1850-2024 The language about the packaging being provided by the certification organization was rejected since this is restrictive and should not be mandated by the standard. As long as the packaging maintains the temperature as required, the company supplying the packaging isn't important.

Public Comment No. 76-NFPA 1850-2024 [Section No. 12.4.7.2]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 104-NFPA 1850-2024 [Section No. 12.4.11]

13.4.11 Specific Requirements for Semivolatile Organic Compound Contained Specimen Preparation, Extraction, and Analysis.

13.4.11.1 Selection of Contaminants.

The following semivolatile organic compounds shall be prepared at a concentration of 200 ppm in a 1:1 mixture of benzene and methylene chloride:

(1) Acenaphthene (CAS No. 83-32-9)

(2) Anthracene (CAS No. 120-12-7)

(3) Diethyl phthalate (CAS No. 84-66-2)

(4) Di-n-octyl phthalate (CAS No. 117-84-0)

(5) Fluorene (CAS No. 86-73-7)

(6) Phenanthrene (CAS No. 85-01-8)

(7) Pyrene (CAS No. 129-00-0)

(8) 2-Nitrophenol (CAS No. 88-75-5)

(9) Phenol (CAS No. 108-95-2)

(10) 2,4,6-Trichlorophenol (CAS No. 88-06-2)

~~Benzo[a]pyrene (CAS No. 50-32-8)~~

~~Benzyl butylphthalate (CAS No. 85-68-7)~~

13.4.11.2 Procedures for Contamination of Specimens.

13.4.11.2.1

Outer shell fabric prepared as specified in 13.4.3.2 shall be cut into 75 mm × 150 mm (3 in. × 6 in.) specimens.

13.4.11.2.2

Using a gastight syringe, a volume of 300 µL of the polycyclic aromatic hydrocarbons (PAH)/phthalate/phenols contamination mixture specified in 13.4.11.1 shall be dispensed uniformly onto each specimen by drawing the solution into the syringe and slowly depressing the plunger onto the specimen while gently rubbing the end of the syringe onto the specimen.

13.4.11.2.3

Contaminated specimens shall be permitted to dry under ambient laboratory conditions for no more than 15 minutes following the application of the PAH/phthalate/phenols mixture.

13.4.11.2.4

The specimen shall be placed in a labeled jar or other container and kept in a refrigerator at 4°C (39°F) until ready for shipping.

13.4.11.2.5

Alternative techniques for contaminating the specimens shall be permitted if it can be demonstrated that the selected technique provides a specimen concentration of the specific contaminant(s) that is ±20 percent of the target concentration following the application of the technique.

13.4.11.3 Extraction of Specimens.

13.4.11.3.1

All labware, jars, or extraction vessels made of glass or other degradation-resistant and contamination-free materials shall be thoroughly cleaned, rinsed, and dried.

13.4.11.3.1.1

Where specified, other types of labware shall be substituted if it can be demonstrated that the labware will not contribute to cross contamination of the extraction liquids.

13.4.11.3.2

An extraction solvent of 50 percent methylene chloride, 25 percent acetonitrile, and 25 percent cyclohexane shall be prepared.

13.4.11.3.3

A PAH/phthalate/phenols dilution solution of a 1:1 ratio of benzene and methylene chloride shall be prepared.

13.4.11.3.4

The specimen to be analyzed shall be cut into eight smaller pieces and placed in a 300 mL (10.1 oz) extraction vessel with a lid.

13.4.11.3.5

Six 16 mm (⅝ in.) polytetrafluoroethylene (PTFE) bearing balls shall be placed in the extraction vessel with the cut specimen pieces.

13.4.11.3.6

A volume of 50 mL (1.7 oz) of the extraction solvent prepared per 13.4.11.3.2 shall be added to the extraction vessel.

13.4.11.3.7

The extraction vessel shall be placed on a platform shaker set at 230 RPM ± 10 RPM and shall be shaken for 30 minutes.

13.4.11.3.8

The extraction vessel shall be removed from the platform shaker and shall be placed in a sonicator for 20 minutes at a no-heat condition.

13.4.11.3.9

Immediately after sonification has been concluded, the extraction vessel shall be vented by lifting the lid to prevent the creation of a vacuum within the vessel.

13.4.11.3.10

The specimens shall be allowed to rest in the extraction vessel until it has returned to room temperature after approximately 10–15 minutes.

13.4.11.3.11

The resulting solution in the extraction vessel shall be filtered using a glass vacuum filtration flask assembly, with a 45 mm (1.77 in.) glass fiber filter placed on the fritted surface of the filtration apparatus and the apparatus then clamped to the flask and connected to a laboratory vacuum line.

13.4.11.3.12

The glass filtration flask and specimen pieces shall be rinsed with 5 mL (1 tsp) of extraction solvent.

13.4.11.3.13

Any excess solvent shall be squeezed from the specimen pieces into the filtration flask.

13.4.11.3.14

The liquid content of the vacuum filtration flask shall be transferred to an oil tube or other graduated condensation vessel suitable for measuring extract evaporation using a small glass funnel.

13.4.11.3.15

Modifications to the specimen extraction procedures provided in 13.4.11.3 shall be permitted, provided that extraction recovery average efficiencies of 80 percent or better can be demonstrated.

13.4.11.4 Preparation of Extract for Analysis.

13.4.11.4.1*

The condensation vessel and contents prepared as specified in 13.4.11.3 shall be placed on the rack under a miniature evaporator/concentrator that is connected to ultra-high-purity nitrogen, and the contents shall be evaporated to less than or equal to 2 mL (0.4 tsp).

13.4.11.4.2

After reconstitution, the condensation vessel shall be placed in a vortex tube and vortexed 10–15 seconds to incorporate any solids that have dried on the side of the tube.

13.4.11.4.3

The contents of the vortex tube shall be measured using a disposable sterile pipette and the volume shall be recorded.

13.4.11.4.4

The contents of the vortex tube shall be returned to the oil tube with an appropriate amount of solvent to increase the final volume to 2 mL (0.4 tsp).

13.4.11.4.5

The oil tube shall be vortexed and the contents shall be transferred with a disposable glass pipette into 10 mL (2 tsp) glass beaker.

13.4.11.4.6

The contents from the beaker shall be removed using a 3 mL (0.6 tsp) syringe with an attached polyvinylidene fluoride (PVDF) 0.45 µm syringe.

13.4.11.4.7

The contents of the syringe shall be filled into an autosampler vial.

13.4.11.4.8*

Alternative procedures for preparing the extract for analysis shall be permitted, provided that the extraction recovery average efficiencies of 80 percent or better can be demonstrated.

13.4.11.5 Analysis of Specimens.

13.4.11.5.1

Calibration curves shall be prepared for each contaminant by applying known concentrations to specimen fabrics and extracting the specimens using the procedures specified in 13.4.11.3 and 13.4.11.4 using the analysis conditions specified in 13.4.11.5.2.

13.4.11.5.2

Extracts prepared as specified in 13.4.11.4 shall be analyzed using gas chromatography and mass spectroscopy using the following analysis parameters:

(1) A fused silica nonpolar 30 m, 0.25 mm ID, 0.50 µm mass spectroscopy column with a guard column that has been deactivated but not coated with stationary phase

(2) Inlet temperature of 200°C (392°F)

(3) Transfer line temperature of 300°C (572°F)

(4) Ion source temperature of 300°C (572°F)

(5) Oven temperature of 60°C (140°F); held for 2 minutes

(6) Temperature ramp of 7°C (44.6°F) per minute to 310°C (590°F); held for 10 minutes

(7) A carrier gas of ultra-high-purity helium at 1.2 L/min (40.6 oz)

(8) 1 µL sample splitless injection via autosampler into inlet containing split/splitless straight with wool topaz liner

13.4.11.5.3

The output from the gas chromatography and mass spectroscopy shall be used to integrate and calculate the concentration of each chemical per mass of specimen remaining with the percentage removal based on the calibration curves.

13.4.11.5.3.1

The concentration in each specimen shall be reported in µg/g specimen.

13.4.11.5.3.2

If the concentration is below the limit of quantification (LOQ), the concentration in the specimen shall be reported as "< LOQ (value) µg/g."

13.4.11.5.4

Cleaning efficiency shall be calculated for each contaminant with the following equation and as specified in 13.4.11.5.4.1 and 13.4.11.5.4.2:

$$\text{cleaning efficiency} = \left[\frac{(C_c - C_M) - (C_W - C_P)}{C_c - C_M}\right] \times 100 \qquad \text{~~[12.4.11.5.4]~~}$$

where:

C_C = Contaminated specimen

C_M = Material specimen (unwashed, not contaminated)

C_W = Contaminated specimen (washed)

C_P = Material specimen (washed, not contaminated)

13.4.11.5.4.1

The actual masses used in the calculation of cleaning efficiency shall be the specific measured concentration of contaminant.

13.4.11.5.4.2

If the measured mass is below the limit of ~~quantitation, a value of "0"~~ quantification (LOQ), the LOQ shall be used.

13.4.11.5.5

The average cleaning efficiency shall be determined and reported for all chemicals collectively from each of the following chemical groups:

(1) Phenols, as follows:

(a) Nitrophenol

(b) Phenol

(c) 2,4,6-Trichlorophenol

(2) PAHs, as follows:

(a) Acenaphthene

(b) Anthracene

(c) Fluorene

(d) Phenanthrene

(e) Pyrene

~~Benzo[a]pyrene~~

(3) Phthalates, as follows:

(a) Diethyl phthalate

(b) Di-n-octyl phthalate

~~Benzyl butyl -phthalate~~

13.4.11.5.5.1

If any cleaning efficiencies are indicated as being above 100 percent, a cleaning efficiency of 100 percent shall be used for the purpose of calculating the average cleaning efficiency.

13.4.11.5.5.2

If any cleaning efficiencies are indicated as being below 0 percent, a cleaning efficiency of 0 percent shall be used for the purpose of calculating the average cleaning efficiency.

13.4.11.5.5.3

If any analytical anomaly that cannot be rationalized on the basis of the data set and other measurements is encountered for the analysis of a specific contaminant, discarding one contaminant from the calculation of the average cleaning efficiency shall be permitted.

13.4.11.5.6*

Alternative procedures for the analysis of specimens specified in 13.4.11.5.1 through 13.4.11.5.3 shall be permitted, provided that the procedures take the concentrations of the controls into account by providing sufficient sensitivity to allow for the measurement of a 1.0 percent difference or lower in cleaning efficiency.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 14:02:01 EDT 2024

Committee Statement

Committee Statement: Two additional chemicals for cleaning verification for removal of semivolatile organic compounds were added as part of the first draft, but no validation efforts were undertaken to determine how the addition of these two chemicals would impact measured cleaning verification results for qualifying ISP and other organizations. Also, no consensus was achieved for how to use information related to the grouping of semivolatile organic compound cleaning efficiency results. Lastly, corrections were made

for how values below the limit of quantification for the respective contaminants were to be handled in the reporting of contaminant concentrations and calculation of cleaning efficiencies.

Response Message: SR-104-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
3 Affirmative with Comments
0 Negative with Comments
1 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Abstention

McMillan, Neil

I see value in the proposed added PAH

Second Revision No. 94-NFPA 1850-2024 [Section No. 12.4.14.1.2]

13.4.14.1.2

Surrogate garment outer shells shall be made from an undyed 60 percent para-aramid/40 percent polybenzimidazole (PBI) base fabric with a reinforcement grid meeting the following specifications:

(1) The outer shell fabric shall have a unit area weight of 240 g/m^2 to 268 g/m^2 (7.1 oz/yd^2 to 7.9 oz/yd^2).

(2) The outer shell fabric shall have a thickness of 0.584 mm ± 0.254 mm (0.023 in. ± 0.10 in.).

(3) The outer shell fabric shall have a water absorption resistance of less than 5 percent when tested in pristine condition in accordance with ~~Section 9.25~~ 9.4.1 of NFPA 1970.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Tue Sep 03 15:32:34 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The section number of the water absorption resistance test was changed in the Second Draft of NFPA 1970.

Response Message: SR-94-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

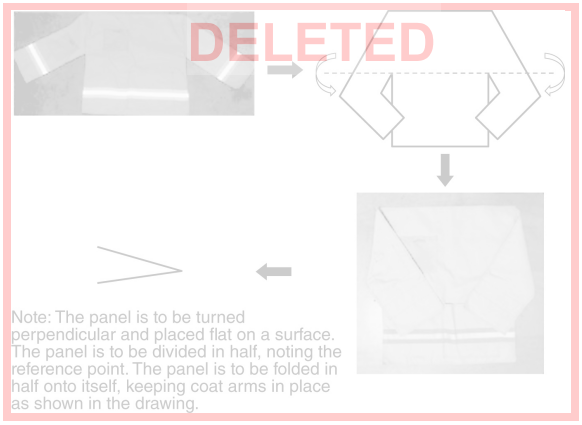
Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

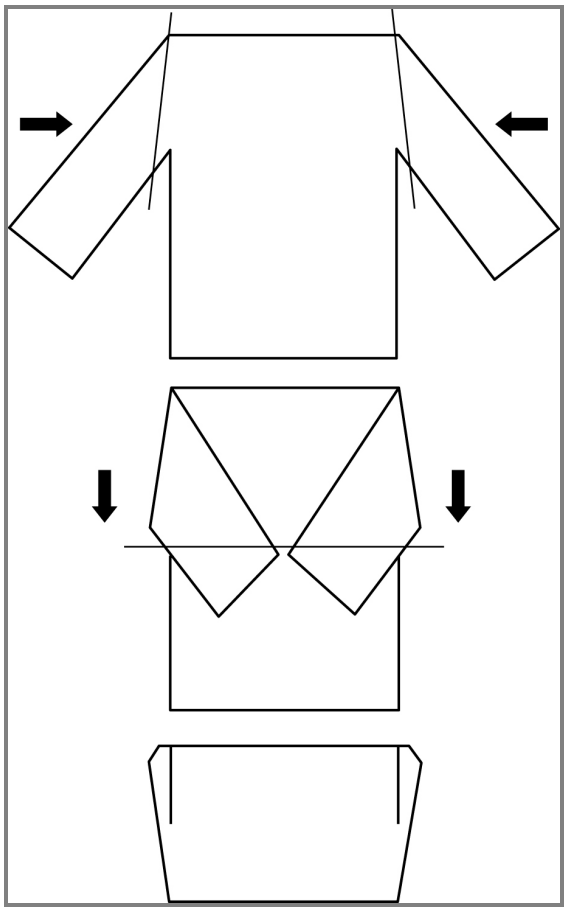
Second Revision No. 53-NFPA 1850-2024 [Section No. 12.4.14.2.7]

13.4.14.2.7

The surrogate coat shall be folded and placed into the wash load as shown in Figure 13.4.14.2.7.

Figure 13.4.14.2.7 Folding Diagram for the Surrogate Coat.

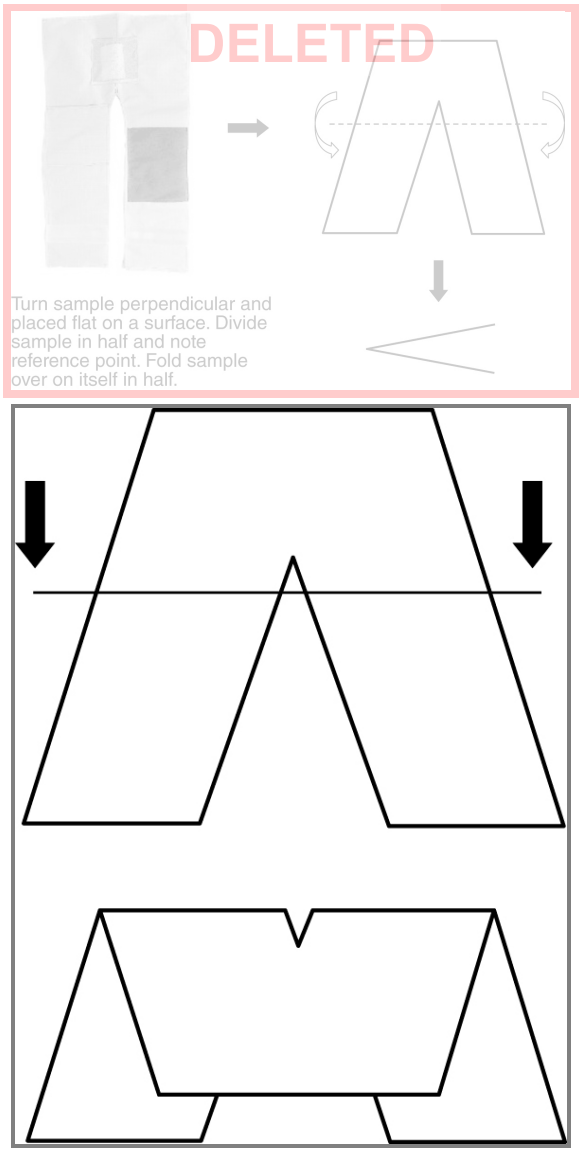




13.4.14.2.8

The surrogate pant shall be folded and placed into the wash load as shown in 13.4.14.2.8.

Figure 13.4.14.2.8 Folding Diagram for the Surrogate Pant.



Supplemental Information

File Name	Description	Approved
Fig_12.4.14.2.7.jpg	staff use - for editorial	
Fig_12.4.14.2.8.jpg	staff use - for editorial	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 15:57:51 EDT 2024

Committee Statement

Committee Statement:	During first draft, the surrogate garments were updated to remove the reflective trim. The figures need to be updated to remove the photographs of the surrogates that indicate that trim is present.
Response Message:	SR-53-NFPA 1850-2024

Public Comment No. 54-NFPA 1850-2024 [Sections 12.4.14.2.7, 12.4.14.2.8]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 50-NFPA 1850-2024 [Section No. 12.5.1]

~~**12.5.1** Overview.~~

~~Two sets of garment material samples shall be prepared and subject to a minimum of 30 cycles of advanced cleaning for the process to be evaluated where the results for testing of specimens taken from samples subjected to the multiple cycles of advanced cleaning are compared against both the existing NFPA 1970 (1971) performance criteria and against the results for samples that were not subject to advanced cleaning.~~

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 15:36:31 EDT 2024

Committee Statement

Committee Statement: Section 12.5.1 is deleted because a summary of the test procedure is unnecessary.
Response Message: SR-50-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn

Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 122-NFPA 1850-2024 [Section No. 12.5.2.3]

13.5.1.3

Composite panels measuring 66 cm × 66 cm (26 in. × 26 in.) shall be prepared in a sufficient number to provide the necessary specimens specified in Table 13.5.1.3 using selected composite materials using the following construction details:

(1) Outer shell material layers shall be prepared as a single layer and shall have a finished edge of each side.

(2) Liner panels shall be prepared using a layer of moisture barrier and layer of thermal barrier where the combination of both layers has a finished edge on each side.

(3) Some panels shall include a seam of the respective layer(s) that bisects the panel.

(4) Some panels shall include three rows equally separated of one high-visibility trim that is parallel to one side. Separate outer shell panels shall have the second trim.

(5) Some outer shell panels shall have a product label attached to either side of the shell material layer.

(6) Some liner panels shall have a product label lining panel attached to the thermal barrier side of the panel.

(7) Some outer shell panels without seams shall have parallel sets of three marks in both panel directions on one surface of the panel for the measurement of cleaning shrinkage.

(8) Some liner panels without seams shall have parallel sets of three marks in both panel directions on both the moisture barrier and thermal barrier sides for the measurement of cleaning shrinkage.

(9) The material direction shall be marked in each direction.

(10) All marks shall be made in a way that they are not removed by the cleaning.

Table 13.5.1.3 Selected Performance Properties and Sample Requirements

Performance Property	Test Method (in NFPA 1970)	Type of Sample(s)	Specimens Required (in NFPA 1970)
~~Thermal protective performance (TPP)~~	~~Section 9.2.16~~	~~Composite~~	~~Three 150 mm (6 in.) squares~~
Flame resistance	~~Section 8.2~~ 9.2.1	Outer shell, moisture barrier, thermal barrier	Five 75 mm × 305 mm (3 in. × 12 in.) rectangles ~~(~~ in each material direction~~)~~ conditioned per 9.1.3 Five 75 mm × 305 mm (3 in. × 12 in.) rectangles in each material direction conditioned per 9.1.2 and then 9.1.3
Thermal protective performance (TPP)	9.2.16	Composite	Three 150 mm (6 in.) squares conditioned per 9.1.3
Tear resistance	~~Section~~ 9.3.1	Outer shell, moisture barrier, thermal barrier	~~Five 75 mm × 150 mm (3 in. × 6 in.) rectangles (in each material direction)~~ Outer shell: One 1 m (1 yd) square conditioned per 9.1.22 Moisture and thermal barrier: One 1 m (1 yd) square conditioned per 9.1.2 Specimens are cut from conditioned sample
Breaking strength	~~Section~~ 9.3.2	Outer shell	~~Five 100 mm × 200 mm (4 in. × 8 in.) rectangles (in each material direction)~~ One 1 m (1 yd) square conditioned per 9.1.2 (10 cycles) Specimens are cut from conditioned sample

Performance Property	Test Method (in NFPA 1970)	Type of Sample(s)	Specimens Required (in NFPA 1970)
Seam-breaking strength	~~Section~~ 9.3.4	Major outer shell, moisture barrier, thermal barrier	~~Five 100 mm × 200 mm (4 in. × 8 in.) rectangles where seam bisects long dimension~~ One 1 m (1 yd) length of seam conditioned per 9.1.2 Specimens are cut from conditioned sample
Water absorption resistance	~~Section~~ 9.4.1	Outer shell	Three 200 mm (8 in.) squares conditioned per 9.1.2
~~Cleaning shrinkage resistance~~	~~Section 9.9.1~~	~~Outer shell, moisture barrier, thermal barrier~~	~~Five 375 mm (15 in.) squares~~
Liquid penetration resistance–Fuel H	~~Section~~ 9.4.3	Moisture barrier seams	Three ~~75~~ 380 mm (~~3~~ 15 in.) squares of prepared composite samples conditioned per 9.1.2 followed by 9.1.3 followed by 9.1.5, then all three procedures again Specimens are cut from prepared and conditioned composites
Liquid barrier performance or ~~Viral~~ viral penetration resistance	~~Section~~ Section 9.11 or 9.4.5	Moisture barrier seams	~~Four 75 mm (3 in.) squares~~ Three 380 mm (15 in.) squares of prepared composite samples conditioned per 9.1.2 followed by 9.1.3 followed by 9.1.5, then all three procedures again Specimens are cut from prepared and conditioned composites
Retroreflectivity and fluorescence	~~Section~~ 9.8.1	Trim sections	~~Four~~ One 305 mm (12 in.) ~~lengths~~ long sample conditioned per 9.1.2 Specimens are cut from conditioned sample
Label legibility	~~Section~~ 9.8.12	Labels applied to specific layers	~~Three~~ Nine labels ~~of each type~~ attached to fabric and conditioned per 9.1.3
Cleaning shrinkage resistance	~~Section~~ 9.9.1	Outer shell, moisture barrier, thermal barrier	Five ~~375~~ 380 mm (~~3~~ 15 in.) squares conditioned per 9.1.3

Supplemental Information

File Name	Description	Approved
1850_SPF_SR122_12.5.2.3.docx	staff use	
1850_SR-122_12.5.2.3_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Mon Sep 09 16:27:05 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA

Standards (nfpa.org/regs).

Table 12.5.2.3 is updated per the NFPA 1970 Second Draft. The section numbers are changed because the Test Methods chapter in NFPA 1970 was reorganized. The new Liquid Barrier Performance test is added to the table because it replaced the Viral Penetration Resistance test in NFPA 1970. The Viral Penetration Resistance test is retained in the table as an alternative to the Liquid Barrier Performance test based the effects of TIA 25-4 (SC 24-8-27 / TIA Log #1789). The specimen requirements for all tests are updated to match the requirements in NFPA 1970. The tests are reordered per their NFPA 1970 section numbers.

Response Message: SR-122-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
3 Affirmative with Comments
0 Negative with Comments
1 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
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Newsom, Amanda H.

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Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Abstention

McMillan, Neil

abstain

Second Revision No. 51-NFPA 1850-2024 [Section No. 12.5.3.1]

13.5.2.1

Panels shall be subject to at least 30 cycles of advanced cleaning using the same steps applied in the verification of the advanced cleaning process. *(See A.6.3.7.3 .)*

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 15:44:00 EDT 2024

Committee Statement

Committee Statement: A cross-reference to A.7.3.7.3 is added to help the user understand the effects of repeated washing on gear.
Response Message: SR-51-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
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Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
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Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 56-NFPA 1850-2024 [Section No. 12.6]

13.6 Cleaning Efficacy Test 2.

The procedures in Section 13.4 shall be adapted for application to other outer shell materials and to moisture barrier and thermal barrier materials using the following modifications:

(1) Where a different outer shell material is to be evaluated, the new outer shell shall be substituted for the current outer shell material specified in 13.4.3.1.

(2) Where a moisture barrier is used, samples of moisture barrier shall be substituted for the current outer shell material specified in 13.4.3.1 and the side of the moisture barrier facing the outer shell shall be contaminated.

(3) Where a thermal barrier is used, samples of ~~moisture~~ thermal barrier shall be substituted for the current outer shell material specified in 13.4.3.1 and the side of the thermal barrier facing the moisture barrier shall be contaminated.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 16:13:44 EDT 2024

Committee Statement

Committee Statement: The typo in item (3) is corrected.
Response Message: SR-56-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

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Fanning, David P.

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Herring, Todd

Kiser, Jonathan Britt

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Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 105-NFPA 1850-2024 [Section No. 12.7.11]

13.7.11 Specific requirements Semivolatile Organic Compound Contained Specimen Preparation, Extraction, and Analysis.

13.7.11.1 Selection of Contaminants.

The following semivolatile organic compounds shall be prepared at a concentration of 200 ppm in a 1:1 mixture of benzene and methylene chloride:

(1) Acenaphthene (CAS No. 83-32-9)

(2) Anthracene (CAS No. 120-12-7)

(3) Diethyl phthalate (CAS No. 84-66-2)

(4) Di-n-octyl phthalate (CAS No. 117-84-0)

(5) Fluorene (CAS No. 86-73-7)

(6) Phenanthrene (CAS No. 85-01-8)

(7) Pyrene (CAS No. 129-00-0)

(8) 2-Nitrophenol (CAS No. 88-75-5)

(9) Phenol (CAS No. 108-95-2)

(10) 2,4,6-Trichlorophenol (CAS No. 88-06-2)

~~Benzo[a]pyrene (CAS No. 50-32-8)~~

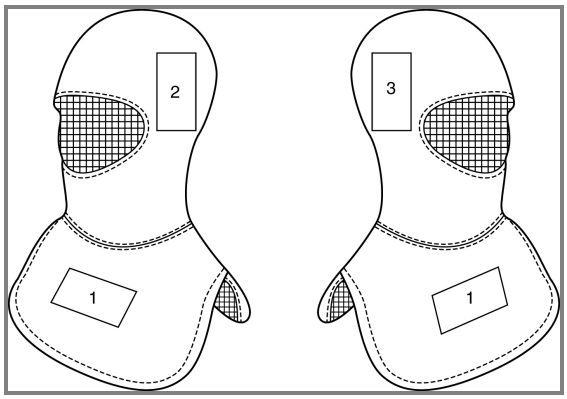
~~Benzyl Butyl phthalate (CAS No. 117-81-7)~~

13.7.11.2 Procedures for Contamination of Specimens.

13.7.11.2.1

Hood specimens prepared as specified in 13.7.3.2 shall be marked according to Figure 13.7.11.2.1 so that there are three 75 mm × 150 mm (3 in. × 6 in.) areas indicated on each hood for contamination.

Figure 13.7.11.2.1 Marking Areas for Contamination



13.7.11.2.2

Using a gastight syringe, a volume of 300 µL of the polycyclic aromatic hydrocarbons (PAH)/phthalate/phenols contamination mixture specified in 13.7.11.1 shall be dispensed uniformly onto each specimen by drawing the solution into the syringe and slowly depressing the plunger onto the specimen in location two and location three of each specimen hood while gently rubbing the end of the syringe onto the specimen.

13.7.11.2.3

Contaminated specimens shall be permitted to dry under ambient laboratory conditions for no more than 15 minutes following the application of the PAH/phthalate/phenols mixture.

13.7.11.2.4

The specimen shall be placed in a refrigerator at 4°C (39°F) until ready for shipping.

13.7.11.2.5

Alternative techniques for contaminating the specimens shall be permitted if it can be demonstrated that the selected technique provides a specimen concentration of the specific contaminant(s) that are ±20 percent of the target concentration following the application of the technique.

13.7.11.3 Extraction of Specimens.

13.7.11.3.1

All labware, jars, or extraction vessels made of glass or other degradation-resistant and contamination-free materials shall be thoroughly cleaned, rinsed, and dried.

13.7.11.3.1.1

Where specified, other types of labware shall be substituted if it can be demonstrated that the labware will not contribute to cross contamination of the extraction liquids.

13.7.11.3.2

An extraction solvent of 50 percent methylene chloride, 25 percent acetonitrile, and 25 percent cyclohexane shall be prepared.

13.7.11.3.3

A PAH/phthalate/phenols dilution solution of a 1:1 ratio of benzene and methylene chloride shall be prepared.

13.7.11.3.4

The specimen to be analyzed shall be cut from the finished hood and into eight smaller pieces and placed in a 300 mL (10.1 oz) extraction vessel with a lid.

13.7.11.3.5

Six 16 mm (⅝ in.) polytetrafluoroethylene (PTFE) bearing balls shall be placed in the extraction vessel with the cut specimen pieces.

13.7.11.3.6

A volume of 50 mL (1.7 oz) of the extraction solvent prepared per 13.7.11.3.2 shall be added to the extraction vessel.

13.7.11.3.7

The extraction vessel shall be placed on a platform shaker set at 230 RPM ± 10 RPM and shall be shaken for 30 minutes.

13.7.11.3.8

The extraction vessel shall be removed from the platform shaker and shall be placed in a sonicator for 20 minutes at a no-heat condition.

13.7.11.3.9

Immediately after sonification has been concluded, the extraction vessel shall be vented by lifting the lid to prevent the creation of a vacuum within the vessel.

13.7.11.3.10

The specimens shall be allowed to rest in the extraction vessel until it has returned to room temperature after approximately 10–15 minutes.

13.7.11.3.11

The resulting solution in the extraction vessel shall be filtered using a glass vacuum filtration flask assembly, with a 45 mm (1.77 in.) glass fiber filter placed on the fritted surface of the filtration apparatus and the apparatus then clamped to the flask and connected to a laboratory vacuum line.

13.7.11.3.12

The glass filtration flask and specimen pieces shall be rinsed with 5 mL (1 tsp) of extraction solvent.

13.7.11.3.13

Any excess solvent shall be squeezed from the specimen pieces into the filtration flask.

13.7.11.3.14

The liquid content of the vacuum filtration flask shall be transferred to an oil tube or other graduated condensation vessel suitable for measuring extract evaporation using a small glass funnel.

13.7.11.3.15

Modifications to the specimen extraction procedures provided in 13.7.11.3 shall be permitted, provided that extraction recovery average efficiencies of 80 percent or better can be demonstrated.

13.7.11.4 Preparation of Extract for Analysis.

13.7.11.4.1

The condensation vessel and contents prepared as specified in 13.7.11.3 shall be placed on the rack under a miniature evaporator/concentrator that is connected to ultra-high-purity nitrogen, and the contents shall be evaporated to less than or equal to 2 mL (0.4 tsp).

13.7.11.4.2

After reconstitution, the condensation vessel shall be placed in a vortex tube and vortexed 10–15 seconds to incorporate any solids that have dried on the side of the tube.

13.7.11.4.3

The contents of the vortex tube shall be measured using a disposable sterile pipette and the volume shall be recorded.

13.7.11.4.4

The contents of the vortex tube shall be returned to the oil tube with an appropriate amount of solvent to increase the final volume to 2 mL (0.4 tsp).

13.7.11.4.5

The oil tube shall be vortexed, and the contents shall be transferred with a disposable glass pipette into a 10 mL (2 tsp) glass beaker.

13.7.11.4.6

The contents from the beaker shall be removed using a 3 mL (0.6 tsp) syringe with an attached polyvinylidene fluoride (PVDF) 0.45 µm syringe.

13.7.11.4.7

The contents of the syringe shall be filled into auto-sampler vial.

13.7.11.4.8

Alternative procedures for preparing the extract for analysis shall be permitted, provided that the extraction recovery average efficiencies of 80 percent or better can be demonstrated.

13.7.11.5 Analysis of Specimens.

13.7.11.5.1

Calibration curves shall be prepared for each contaminant by applying known concentrations to specimens and extracting the specimens using the procedures specified in 13.7.11.3 and 13.7.11.4 using the analysis conditions specified in 13.7.11.5.2.

13.7.11.5.2

Extracts prepared as specified in 13.7.11.4 shall be analyzed using gas chromatography and mass spectroscopy using the following analysis parameters:

(1) A fused silica nonpolar 30 m, 0.25 mm ID, 0.50 µm mass spectroscopy column with a guard column that has been deactivated but not coated with stationary phase

(2) Inlet temperature of 200°C (392°F)

(3) Transfer line temperature of 300°C (572°F)

(4) Ion source temperature of 300°C (572°F)

(5) Oven temperature of 60°C (140°F); held for 2 minutes

(6) Temperature ramp of 7°C (44.6°F) per minute to 310°C (590°F); held for 10 minutes

(7) A carrier gas of ultra-high-purity helium at 1.2 L/min (40.6 oz)

(8) 1 µL sample splitless injection via autosampler into inlet containing split/splitless straight with wool topaz liner

13.7.11.5.3

The output from the gas chromatography and mass spectroscopy shall be used to integrate and calculate the concentration of each chemical per mass of specimen remaining with the percentage removal based on the calibration curves.

13.7.11.5.3.1

The concentration in each specimen shall be reported in µg/g specimen.

13.7.11.5.3.2

If the concentration is below the limit of quantification (LOQ), the concentration in the specimen shall be reported as "< LOQ (value) µg/g."

13.7.11.5.4

Cleaning efficiency shall be calculated for each contaminant with the following equation and as specified in 13.7.11.5.4.1 and 13.7.11.5.4.2:

$$\text{cleaning efficiency} = \left[\frac{(C_c - C_M) - (C_W - C_P)}{(C_C - C_M)}\right] \times 100 \qquad \text{~~[12.7.11.5.4]~~}$$

where:

C_C = Contaminated specimen

C_M = Material specimen (unwashed, not contaminated)

C_W = Contaminated specimen (washed)

C_P = Material specimen (washed, not contaminated)

13.7.11.5.4.1

The actual masses used in the calculation of cleaning efficiency shall be the specific measured concentration of contaminant.

13.7.11.5.4.2

If the measured mass is below the limit of ~~quantitation, a value of "0"~~ quantification (LOQ), the LOQ shall be used.

13.7.11.5.5

The average cleaning efficiency shall be determined ~~for~~ and reported for all chemicals collectively from each of the following chemical groups:

(1) Phenols, as follows:

(a) 2-Nitrophenol

(b) Phenol

(c) 2,4,6-Trichlorophenol

(2) PAHs, as follows:

(a) Acenaphthene

(b) Anthracene

(c) Fluorene

(d) Phenanthrene

(e) Pyrene

~~Benzo[a]pyrene~~

(3) Phthalates, as follows:

(a) Diethyl phthalate

(b) Di-n-octyl phthalate

~~Benzyl butyl phthalate~~

13.7.11.5.5.1

If any cleaning efficiencies are indicated as being above 100 percent, a cleaning efficiency of 100 percent shall be used for calculating the average cleaning efficiency.

13.7.11.5.5.2

If any cleaning efficiencies are indicated as being below 0 percent, a cleaning efficiency of 0 percent shall be used for calculating the average cleaning efficiency.

13.7.11.5.5.3

If any analytical anomaly that cannot be rationalized on the basis of the data set and other measurements is encountered for the analysis of a specific contaminant, discarding one contaminant from the calculation of the average cleaning efficiency shall be permitted.

13.7.11.5.6

Alternative procedures for the analysis of specimens specified in 13.7.11.5.1 through 13.7.11.5.3 shall be permitted, provided that the procedures take the concentrations of the controls into account by providing sufficient sensitivity to allow for the measurement of a 1.0 percent difference or lower in cleaning efficiency.

Supplemental Information

File Name	Description	Approved
1850_SR-105_12.7.11_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 14:18:22 EDT 2024

Committee Statement

Committee Statement: Two additional chemicals for cleaning verification for removal of semivolatile organic compounds were added as part of the first draft, but no validation efforts were undertaken to determine how the addition of these two chemicals would impact measured cleaning verification results for qualifying ISP and other organizations. Also, no consensus was achieved for how to use information related to the grouping of semivolatile organic compound cleaning efficiency results. Lastly, corrections were made for how values below the limit of quantification for the respective contaminants were to be handled in the reporting of contaminant concentrations and calculation of cleaning efficiencies.

Response Message: SR-105-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
3 Affirmative with Comments
0 Negative with Comments
1 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Abstention

McMillan, Neil

I see value in adding the proposed PAH

Second Revision No. 57-NFPA 1850-2024 [Sections 12.8, 12.9]

13.8 PAH Removal Efficacy Test.

The procedures in Section 13.4 shall be adapted for application to outer shell, moisture barrier, and thermal barrier materials using the following modifications:

(1) The list of PAHs to be evaluated shall include the chemicals listed in Table 13.8.

(2) A mixture of the PAHs shall be prepared that is in the same concentration for each PAH as specified in 13.4.11.2.

(3) Where a moisture barrier is used, both of the following shall apply:

(a) Samples of moisture barrier shall be substituted for the current outer shell material specified in 13.4.3.1 .

(b) The side of the moisture barrier facing the outer shell shall be contaminated.

(4) Where a thermal barrier is used, both of the following shall apply:

(a) Samples of thermal barrier shall be substituted for the current outer shell material specified in 13.4.3.1 .

(b) The side of the thermal barrier facing the moisture barrier shall be contaminated.

Table 13.8 List of Polycyclic Aromatic Hydrocarbon (PAH) Substances

PAH Chemical	CAS Number
Acenaphtene	83-32-9
Acenaphthylene	208-96-8
Anthracene	120-12-7
Benzo[a]anthracene	56-55-3
Benzo[a]pyrene	50-32-8
Benzo[b]fluoranthene	205-99-2
Benzo[e]pyrene	192-97-2
Benzo[g,h,i]perylene	191-24-2
Benzo[j]fluoranthene	205-82-3
Benzo(k)fluoranthene	207-08-9
Chrysene	218-01-9
Cyclopenta[c,d]pyrene	27208-37-3
Dibenzo[a,h]anthracene	53-70-3
Dibenzo[a,e]pyrene	192-65-4
Dibenzo[a,h]pyrene	189-64-0
Dibenzo[a,i]pyrene	184-55-9
Dibenzo[a,l]pyrene	191-30-0
Fluoranthene	206-44-0
Fluorene	86-73-7
Indeno(1,2,3-cd)pyrene	193-39-5
1-Methylpyrene	2381-21-7
Naphthalene	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0

13.9 PFAS Removal Efficacy Test.

The procedures in Section 13.4 shall be adapted for application to outer shell, moisture barrier, and thermal barrier materials using the following modifications:

(1) The PFAS chemicals to be evaluated shall include the chemicals listed in Table 13.9.

(2) The challenge concentration of PFAS chemical in the solution shall be at 0.1 mg/kg.

(3) The test procedures for the analysis of PFAS shall be in accordance with ISO 23702-1, *Leather — ~~Organic Fluorine~~ Per- and polyfluoroalkyl substances — Part 1: Determination of ~~the Non-Volatile Compound Content By Extraction Method Using Liquid Chromatography/Tandem Mass Spectrometry Detector (LC-MS/MS)~~ non-volatile compounds by extraction method using liquid chromatography* .

(4) Where a moisture barrier is used, both of the following shall apply:

(a) Samples of moisture barrier shall be substituted for the current outer shell material specified in 13.4.3.1 .

(b) The side of the moisture barrier facing the outer shell shall be contaminated.

(5) Where a thermal barrier is used, both of the following shall apply:

(a) Samples of thermal barrier shall be substituted for the current outer shell material specified in 13.4.3.1 .

(b) The side of the thermal barrier facing the moisture barrier shall be contaminated.

Table 13.9 Per- and Polyfluorinated Compounds Subject to Analysis

Per- and Polyfluorinated Compounds	CAS Number
Perfluorooctane Sulfonic Acid and Sulfonates (PFOS)	1763-23-1, et al.
Perfluorooctane Sulfonamide (PFOSA)	754-91-6
Perfluorooctance Sulfonfuoride (PFOSF)	307-35-7
N-Methyl Perfluorooctane Sulfonamide (N-Me-FOSA)	31506-32-8
N-Ethyl Perfluorooctane Sulfonamide (N-Et-FOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide Ethanol (N-Me-FOSE)	24448-09-7
N-Ethyl Perfluorooctane Sulfonamide Ethanol (N-Et-FOSE)	1691-99-2
Perfluorooctanoic Acid (PFOA)	375-85-9
Perfluoroheptanoic Acid (PFHpA)	335-67-1
Perfluorononanoic Acid (PFNA)	375-95-1
Perfluorodecanoic Acid (PFDA)	335-76-2
Henicocafluoroundecanoic Acid (PFUdA)	2058-94-8
Trisafluorododecanoic Acid (PFDoA)	307-55-1
Pentacosafluorotridecanoic Acid (PFTrDA)	72629-94-8
Heptacosafluorotetradecanoic Acid (PFTeDA)	376-06-7, et al.
1H,1H,2H,2H-Perfluorooctyl Acrylate (8:2 FTA)	27905-45-9
1H,1H,2H,2H-Perfluoro-1-decanol (8:2 FTOH)	678-39-7
1H,1H,2H,2H-Perfluorodecanesuphonic Acid (8:2 FTS)	39108-34-4, et al.
Perfluorohexane sulfonic acid (PFHxS)	355-46-4

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 16:15:24 EDT 2024

Committee Statement

Committee Statement: In Section 12.8 and 12.9, two additional modifications are added to address the correct side of each layer for applying the contamination.

In Section 12.9, perfluorohexane sulfonic acid (PFHxS) is added to the list of compounds subject to analysis. A 2020 journal article published by the National Library of Medicine titled, On the Ability of Perfluorohexane Sulfonate (PFHxS) Bioaccumulation by Two Pseudomonas sp. Strains Isolated from PFAS-Contaminated Environmental Matrices, states that PFHxS, "...has been largely used as an efficient surfactant in place of both PFOS and PFOA due to its physical-chemical stability,..." The European Chemicals Agency (ECHA) states, "PFHxS is one of the most frequently detected perfluorinated substances (PFAS) in human blood samples worldwide." Since PFAS blood testing for Department of Defense (DoD) firefighters began in October 2020, PFHxS has been detected in most DoD firefighters; several test results indicate significant levels of PFHxS. PFHxS is a known replacement to certain PFAS chemicals and is a known carcinogen.

Response Message: SR-57-NFPA 1850-2024

Public Comment No. 2-NFPA 1850-2024 [Section No. 12.9]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 58-NFPA 1850-2024 [Sections 12.10, 12.11, 12.12, 12.13]

13.10 Mobile and Stationary Energy Storage System Fire Decomposition Products Removal Efficacy Test. (Reserved)

~~The procedures in Section 12.4 shall be adapted for application to outer shell, moisture barrier, and thermal barrier materials using modifications based on the principles established in "Firefighters' Clothing Contamination in Fires of Electric Vehicle Batteries and Photovoltaic Modules—Literature Review and Pilot Tests Results" [Szmytke, E., et al.) and "Firefighters' Clothing Contamination in Fires of Electric Vehicle Batteries and Photovoltaic Modules—Literature Review and Pilot Tests Results," *International Journal of Environmental Research and Public Health,* 19(19), 12442].~~

13.11 Evaluation of Asbestos ~~Removal Efficacy Test~~ on Protective Elements . ~~[Reserved]~~

13.11.1 Application.

This evaluation method shall apply to protective elements that are suspected or known to be contaminated with asbestos fibers or debris that includes asbestos fibers.

13.11.2 Protective Element Handling and Laboratory Selection.

13.11.2.1

Protective elements are suspected or known to be contaminated with asbestos fibers shall be separately sealed in a plastic bag by the organization for handling following the determination for the need to evaluate the respective protective element(s).

13.11.2.2*

The organization shall select a laboratory for performing this evaluation method that is accredited to ISO 17025, *General requirements for the competence of testing and calibration laboratories* , specifically for asbestos testing.

A.13.11.2.2

It is recommended that selected laboratories have their accreditation through the National Voluntary Laboratory Accreditation Program (NVLAP) operated by the National Institute of Standards and Technology, which has a specific program in place for the accreditation of asbestos fiber analysis.

13.11.2.3

The organization shall follow the laboratory's chain of custody and sample handling and shipping procedures.

13.11.2.4

Upon receipt by the selected laboratory, the bagged protective elements shall remain unopened until the evaluation is to be conducted.

13.11.3 Evaluation Equipment and Supplies.

13.11.3.1

The equipment to be used in this evaluation method shall include a specialized sampling pump that withdraws air at a rate of 2 L/min through a transmission electron microscopy (TEM) cassette.

13.11.3.2

The TEM cassette shall include a 25 mm, 0.45 micron, mixed cellulose ester (MCE) filter.

13.11.4 Test Procedures.

13.11.4.1

Each separate bagged protective element shall be opened in a sterile room and subjected to vacuuming of all surfaces before a different bagged protective element is evaluated.

13.11.4.2

The vacuuming shall be performed on the entire surface of each protective element, including both sides of the outer shell and both sides of the liner for protective garments subjected to testing at a rate of 2 L/min.

13.11.4.3

Multiple cassettes shall be used as needed for each protective element, depending on its overall surface area in the amount of lint, debris, or other surface contaminants that are present.

13.11.4.4

Following vacuuming, the protective element shall be sealed back in its original bag.

13.11.4.5

Each cassette filter sample shall be analyzed to identify and quantify asbestos fibers using TEM according to ASTM D5755, *Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Surface Loading* .

13.11.4.6

Modifications of these procedures shall be permitted if the laboratory demonstrates that the collection method has the ability to reliably collect asbestos fibers from the surfaces of the protective elements.

13.11.5 Results.

13.11.5.1

The laboratory shall provide a report with the following information:

(1) The organization providing the protective element

(2) The identification of the protective element, including the manufacturer, model number, and lot or serial number, and date of manufacture

(3) The condition of the protective element and an indication if the protective element has been cleaned following suspected or actual exposure to asbestos

(4) The identification and quantification of asbestos fibers present on each protective element evaluated

13.11.5.2

The results shall be reported as structures (i.e., fibers) per square centimeter of protective element surface area.

13.11.5.3

The following statements shall be provided in the report:

(1) The laboratory does not guarantee that all asbestos fibers have been captured.

(2) The interpretation of the results from this evaluation are the responsibility of the organization or authority having jurisdiction.

13.11.6 Interpretation.

The organization requesting this evaluation shall determine an action for or disposition of the protective element based on the purpose of the testing and results of the testing. *(See also A.6.5.4.5 .)*

13.12 Cleaning Efficacy Test 4. (Reserved)

~~The procedures in Section 12.4 shall be adapted for application for verifying a specific type of cleaning equipment or process using the following modifications:~~

~~Where a specific type of cleaning equipment is being verified, the manufacturer shall specify a detergent to be used with their equipment.~~

~~Where a specific type of cleaning process is being verified, the provider shall specify all parts of the process that is being applied for protective garments.~~

13.13 Cleaning Efficacy Test 5. (Reserved)

~~The procedures in Section 12.4 shall be adapted for application for verifying a specific type of cleaning equipment or process using a washer/extractor that meets the requirements of this standard.~~

Supplemental Information

File Name	Description	Approved
1850_SPF_SR58_12.10-12.14.docx	Staff use	

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 16:21:51 EDT 2024

Committee Statement

Committee Statement: Sections 12.10, 12.12, and 12.13 are deleted and reserved because these requirements are still in development.

Section 12.11 is revised. Viable industry practice and annex information in the prior edition of NFPA 1851 have established suitable non-destructive procedures for evaluating if protective elements have asbestos contamination. This annex information has been moved into the optional verifications as part of Section 11.6.6 for establishing where asbestos contamination is present on a protective element that can then inform decisions whether contamination is present and if cleaning is effective using methodology provided in Section 12.11. A new section 7.1.3.3.2.3 has been established to point to how testing must be performed if part of the decision process for decided to decontaminate protective elements suspected or known to be contaminated with asbestos.

Section 12.14 is added and reserved. Research has advanced small scale fireground procedures that are becoming more consistent in imparting contamination from specified fuel loads to protective element samples. This approach offers the ability to better simulate fireground exposures in the manner in which contamination of firefighter protective ensembles and ensemble elements than currently undertaken in the by principal current cleaning verification practices. Such practices provide for potential customization of the contamination sources that can then provide relevant data to inform decisions for appropriate cleaning approaches and their effectiveness.

Response Message: SR-58-NFPA 1850-2024

Public Comment No. 30-NFPA 1850-2024 [Section No. 12.10]

Public Comment No. 31-NFPA 1850-2024 [Sections 12.12, 12.13]

Public Comment No. 75-NFPA 1850-2024 [Sections 12.6, 12.7, 12.8, 12.9, 12.10, 12.11]

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

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Dennison, Tyler J.
Falkenstein-Smith, Ryan
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Fesik, Sr., Jonathan
Forester, Crystal D.
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Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 54-NFPA 1850-2024 [Sections 12.14, 12.15, 12.16, 12.17, 12.18]

~~**12.15** Biological Decontamination Efficacy Test.~~

~~**12.15.1*** Application.~~

~~This test method shall determine the biological decontamination efficacy for outer shell materials in protective garments that are subjected to cleaning facility procedures for the disinfection or sanitization of structural firefighting protective garments.~~

~~**A.12.15.1**~~

~~This test method is used for verifying the efficacy of sanitization to inactivate microbiological contaminants associated with biological contaminants such as body fluids or contaminated water. For the purposes of this testing, a single outer shell material is used where samples of the outer shell material are contaminated with specific types of bacteria under controlled conditions and then subjected to a single cycle of sanitization at the cleaning facility. The results of the test method are used to determine log reductions for two different bacteria: *Klebsiella pneumoniae* and *Staphylococcus aureus*. While this test method is used to assess the effectiveness of sanitization in inactivating or killing these biological contaminants, it cannot be inferred to represent the effectiveness of sanitization procedures to inactivate all forms of microbial contamination in all types of materials under all circumstances.~~

~~**12.15.2*** General Procedures.~~

~~**A.12.15.2**~~

~~The paragraphs in 12.15.2 provide an overall description of procedures for measuring log reduction for sanitization processes in removing biological contaminants from protective garment outer shell materials. Section 12.15 provides the overarching set of procedures for these measurements covering two different types of vegetative bacteria: *Klebsiella pneumoniae* and *Staphylococcus aureus*. Specific procedures for the preparation of bacteria-contaminated specimens, the extraction of bacteria contaminants from both contaminated and noncontaminated specimens, and the analysis of those specimens for specific contaminants are provided in Section 12.18. Section 12.19 is referenced for the preparation of surrogate garments, the preparation of ballast material panels, and the creation of the cleaning load.~~

~~**12.15.2.1**~~

~~The certification organization or its designated laboratory shall contaminate sets of selected outer shell material specimens with the two specific microorganisms.~~

~~**12.15.2.2**~~

~~Biologically contaminated and noncontaminated specimens of the selected outer shell material shall be prepared, appropriately packaged, and sent by the certification organization to the respective ISP with the supplies necessary for subjecting the specimens to the cleaning facility's sanitization procedures.~~

12.15.2.3

Under the supervision of a representative from the certification organization, cleaning facility personnel shall insert the biologically contaminated and noncontaminated outer shell specimens into surrogate clothing samples that shall then be specially placed with designated ballast materials in the cleaning facility's sanitization equipment to form the wash load.

12.15.2.4

The surrogate clothing samples with biologically contaminated and noncontaminated outer shell specimens and designated ballast material shall be subjected to one full cycle of the cleaning facility's sanitization procedures.

12.15.2.5

Following completion of the cleaning facility's sanitization cleaning procedures and under the supervision of a representative from the certification organization, the washed biologically contaminated and noncontaminated outer shell specimens shall be removed by cleaning facility personnel, placed in suitable containers, and shipped back to the certification organization or its designated laboratory.

12.15.2.6*

The certification organization or its designated laboratory shall analyze the washed biologically contaminated and noncontaminated specimens as well as control specimens (contaminated but not laundered) and determine the log reduction of the cleaning facility's advanced sanitization procedures for each of the specified biological contaminants.

A.12.15.2.6

Log reduction is a shorthand for indicating the percentage reduction of microorganisms. For example, a log $_{10}$ 3 reduction is the removal of a 99.9 percent reduction of microorganisms. In this referenced method, the log reduction is based on comparing the reduction of the microorganisms between surrogate fabrics subjected to a sanitization process and the same fabrics subjected to a water wash only. The procedures used in this standard are based on ASTM E2274, *Standard Test Method for Evaluation of Laundry Sanitizers and Disinfectants* , which is one of the test methods specified by the US Environmental Protection Agency (EPA) for determining the efficacy of sanitizers.

12.15.2.7

The certification organization shall separately interpret the log reduction results for each selected microorganism to determine compliance with the criteria for the respective cleaning facility sanitization efficiency specified in 11.3.7 .

12.15.3 Specimen Preparation.

12.15.3.1

The garment outer shell material used for specimens shall be an undyed 60 percent para-aramid/40 percent PBI base fabric with a reinforcement grid and shall meet the following specifications:

The outer shell fabric shall have a unit area weight of 240 to 268 g/m^2 (7.1 oz/yd^2 to 7.9 oz/yd^2).

The outer shell fabric shall have a thickness of 0.584 mm ± 0.254 mm (0.023 in. ± 0.10 in.).

The outer shell fabric shall have a water absorption resistance of less than 5 percent when tested in accordance with Section 8.25 of NFPA 1970 .

12.15.3.2

A total of two specimens shall be prepared for each bacterium as specified in Section 12.17 , and outer shell fabric to be used for testing shall be prepared by laundering for 10 cycles as specified in AATCC 135, *Dimensional Changes of Fabrics after Home Laundering* , using Machine Cycle 1, Wash Temperature V, and Drying Procedure Ai. A 1.82 kg ± 0.1 kg (4.0 lb ± 0.2 lb) load shall be used. A laundry bag shall not be used.

12.15.3.3

A minimum of six specimens shall be contaminated with each bacterium as specified in 12.17.2 .

12.15.3.3.1

The number of contaminated specimens required by 12.14.3.3 shall be permitted to be reduced from six to five specimens if the certification organization can demonstrate that the transportation of the specimens to the cleaning facility does not affect the travel specimen's condition or the bacterial contamination level.

12.15.3.4

Four additional specimens shall be prepared for each type of bacteria as specified in 12.14.3.2 but not contaminated.

12.15.3.4.1

The number of noncontaminated specimens required by 12.14.3.4 shall be permitted to be reduced from four to three specimens if the certification organization can demonstrate that the transportation of the specimens to the cleaning facility does not result in the inadvertent biocontamination of the travel specimen.

12.15.3.5

One contaminated specimen and one noncontaminated specimen shall remain at the certification organization or its designated laboratory.

12.15.4 Specimen Handling, Sample Load Assembly, and Sanitization.

12.15.4.1 General.

Each individual contaminated and noncontaminated specimen shall be placed in a separate sterile container with a label identifying the specimen and shipped overnight by the certification organization or its designated laboratory to the cleaning facility for receipt on the scheduled day of testing.

12.15.4.1.1

Specimens shall be shipped in a manner to maintain their temperature at 4°C (39°F) prior to testing at the cleaning facility.

12.15.4.2 Surrogate Garments.

12.15.4.2.1

The certification organization or its designated laboratory shall provide surrogate garments that have been prepared as specified in 12.18.1 .

12.15.4.2.2

Prior to shipping, each surrogate garment shall be autoclaved for 90 minutes at 121°C (250°F) and then packaged in a manner to maintain the garments' sterility prior to use at the cleaning facility.

12.15.4.2.3

The surrogate garments shall be permitted to be provided separately from the contamination and noncontaminated specimens.

12.15.4.3 Ballast Material Panels.

12.15.4.3.1

The certification organization shall either provide or have the cleaning facility use a white, plain weave, 100 percent polyester ballast fabric that conforms to the following specifications:

The ballast fabric shall have a unit area weight of 346 g/m^2 ± 34 g/m^2 (10.2 oz/yd^2 ± 1.0 oz/yd^2).

The ballast fabric shall have a construction of at least 35 threads in the warp direction and at least 20 threads in the fill or weft direction.

The ballast fabric shall be uncoated and have a durable water repellent finish that results in a horizontal wicking of less than 10 mm (0.40 in) in any direction when tested as specified in AATCC 198, *Horizontal Wicking of Textiles* , after the fabric has been washed a total of 5 cycles as specified in AATCC 135, *Dimensional Changes of Fabrics after Home Laundering* .

The ballast fabric shall have a tensile strength of at least 1560 N (350 lb) when tested as specified in ASTM D5034, *Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)* .

The ballast fabric shall have a tear strength of at least 116 N (26 lb) when tested as specified in ASTM D2261, *Standard Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine)* .

12.15.4.3.2

An alternative ballast material shall be permitted if it is shown to have at least the same weight range specified in 12.4.14.2.1 (1) and meets the horizontal wicking requirement in 12.4.14.2.1 (3).

12.15.4.3.3

A sufficient number of different cut and shaped ballast fabric–based wash panels for creating the wash load shall be prepared in advance of the testing as specified in 12.18.2 .

12.15.4.4 Handling and Disposition of Contaminated Specimens.

12.15.4.4.1*

Under the supervision of a representative from the certification organization, the biologically contaminated and noncontaminated outer shell fabric test specimens shall be unpacked with the following disposition as related separately to both types of bacteria:

One contaminated specimen and one noncontaminated specimen shall remain in their containers, untouched at the cleaning facility, and shall be identified as the “travel specimens.” These specimens shall be permitted to be excluded if the certification organization can demonstrate that the transportation of the specimens to the cleaning facility does not affect the travel specimen’s condition or the biological contamination level.

One noncontaminated specimen shall be inserted in Specimen Pocket 1 of the surrogate coat; one individual contaminated specimen shall be inserted in Specimen Pocket 2 of the surrogate coat, while a second individual contaminated specimen shall be inserted in Specimen Pocket 3 of the surrogate coat.

One noncontaminated specimen shall be inserted in Specimen Pocket 1 of the surrogate pant; one individual contaminated specimen shall be inserted in Specimen Pocket 2 of the surrogate pant, while a second individual contaminated specimen shall be inserted in Specimen Pocket 3 of the surrogate pant.

A.12.15.4.4.1

A total of 10 specimens are prepared and used for types of bacteria. Of the six contaminated specimens, two specimens are inserted into the pockets of a surrogate coat, two specimens are inserted into the pockets of a surrogate pant, one specimen travels with the other specimens to the cleaning facility where the verification is conducted, and the last specimen is retained by the certification organization or its designated laboratory. Of the four noncontaminated (control) specimens, one specimen is inserted into the pocket of a surrogate coat, one specimen is inserted into the pocket of a surrogate pant, one specimen travels with the other specimens to the cleaning facility, and the last specimen is retained by the certification organization or its designated laboratory.

The number of specimens can be reduced to five contaminated specimens and three noncontaminated specimens if the certification organization can demonstrate that the transportation of the specimens to the receiving facility does not affect the specimen's condition or the biocontamination levels. This reduction in sample numbers would occur if the travel specimens are not prepared and sent to the cleaning facility. The removed sixth contaminated specimen and removed fourth noncontaminated specimen are intended to be controls to indicate the transportation of the specimens is not affected by their transport to the cleaning facility.

12.15.4.4.2

The individual handling the specimens shall be wearing clean disposable gloves and shall use tweezers provided by the certification organization for inserting the specimens into the surrogate clothing item pockets.

12.15.4.4.3

The tweezer surfaces that contact the specimens shall be cleaned with an alcohol solution–based disposable wipe between uses.

12.15.4.5 Assembly of Sanitization Load and Application of Sanitization.

12.15.4.5.1

The sanitization load shall be assembled as specified in 12.18.3 and adjusted according to the cleaning facility's procedures for load size.

12.15.4.5.2

If the cleaning's procedures for sanitization involve a pretreatment, such as a presoaking of clothing prior to placement in a washer/extractor or other type of laundering machine, then it shall be permitted to subject only the surrogate clothing with inserted outer shell specimens to the pretreatment without the ballast materials.

12.15.4.5.3

The sanitization load consisting of the surrogate clothing items with inserted outer shell fabric specimens, along with the specified number and types of ballast fabric–based wash panels, shall be subject to the cleaning facility's sanitization procedures for which verification is being performed.

12.15.4.5.4

To shorten the drying time, the surrogate clothing items with inserted outer shell specimens shall be allowed to dry without the ballast fabric–based wash panels.

12.15.4.5.4.1

It shall be permitted to remove the inserted outer shell specimens from the respective surrogate clothing items for faster drying using appropriate tweezers for the type of sample and minimizing any contact or handling with the specimen before drying is complete.

12.15.4.5.5

Following the sanitization process and under the supervision of a representative from the certification organization, the specimens shall be removed from the surrogate clothing items using tweezers, placed in labeled, contamination-free containers, and packaged for overnight shipment to the certification organization or its designated laboratory for evaluation.

12.15.5 Specimen Evaluation.

Test specimens for determining sanitization shall be subject to the extraction and analysis procedures specified in 12.17.3 .

12.15.6 Report.

The following information shall be reported for each bacterial contaminant in each outer shell material:

- Original bacterial count applied to each specimen
- Post-cleaning bacterial count for the unwashed, traveling specimen, if applicable
- Post-cleaning bacterial count for each of the washed specimens, if applicable
- Average post-cleaning bacterial count for the washed specimens
- Post-cleaning bacterial count for the washed, blank specimen
- Calculated log $_{10}$ reduction

12.15.7 Interpretation.

Overall compliance with the requirements for biological decontamination shall be based on the individual reported log $_{10}$ reduction for each biological contaminant.

12.16 Semivolatile Organic Compound Contained Specimen Preparation, Extraction, and Analysis.

12.16.1 Selection of Contaminants.

The following semivolatile organic compounds shall be prepared at a concentration of 200 ppm in a 1:1 mixture of benzene and methylene chloride:

- Acenaphthene (CAS No. 83-32-9)
- Anthracene (CAS No. 120-12-7)
- Diethyl phthalate (CAS No. 84-66-2)
- Di-n-octyl phthalate (CAS No. 117-84-0)
- Fluorene (CAS No. 86-73-7)
- Phenanthrene (CAS No. 85-01-8)
- Pyrene (CAS No. 129-00-0)
- 2-Nitrophenol (CAS No. 88-75-5)
- Phenol (CAS No. 108-95-2)
- 2,4,6-Trichlorophenol (CAS No. 88-06-2)

12.16.2 Procedures for Contamination of Specimens.

12.16.2.1

Outer shell fabric prepared as specified in 12.4.3.2 shall be cut into 75 mm × 150 mm (3 in. × 6 in.) specimens.

12.16.2.2

Using a gastight syringe, a volume of 300 µL of the polycyclic aromatic hydrocarbons (PAH)/phthalate/phenols contamination mixture specified in 12.15.1 shall be dispensed uniformly onto each specimen by drawing the solution into the syringe and slowly depressing the plunger onto the specimen while gently rubbing the end of the syringe onto the specimen.

12.16.2.3

Contaminated specimens shall be permitted to dry under ambient laboratory conditions for no more than 30 minutes following the application of the PAH/phthalate/phenols mixture.

12.16.2.4

The specimen shall be placed in a labeled jar or other container and kept in a refrigerator at 4°C (39°F) until ready for shipping.

12.16.2.5

Alternative techniques for contaminating the specimens shall be permitted if it can be demonstrated that the selected technique provides a specimen concentration of the specific contaminant(s) that are ±20 percent of the target concentration following the application of the technique.

12.16.3 Extraction of Specimens.

12.16.3.1

All labware, jars, or extraction vessels made of glass or other degradation-resistant and contamination-free materials shall be thoroughly cleaned, rinsed, and dried.

12.16.3.1.1

Where specified, other types of labware shall be substituted if it can be demonstrated that the labware will not contribute to cross contamination of the extraction liquids.

12.16.3.2

An extraction solvent of 50 percent methylene chloride, 25 percent acetonitrile, 25 percent cyclohexane shall be prepared.

12.16.3.3

A PAH/phthalate/phenols dilution solution of a 1:1 ratio of benzene and methylene chloride shall be prepared.

12.16.3.4

The specimen to be analyzed shall be cut into eight smaller pieces and placed in a 300 mL (10.1 oz) extraction vessel with a lid.

12.16.3.5

Six 16 mm ($\frac{5}{8}$ in.) polytetrafluoroethylene (PTFE) bearing balls shall be placed in the extraction vessel with the cut specimen pieces.

12.16.3.6

A volume of 50 mL (1.7 oz) of the extraction solvent prepared per 12.15.3.2 shall be added to the extraction vessel.

12.16.3.7

The extraction vessel shall be placed on a platform shaker set at 230 RPM ± 10 RPM and shall be shaken for 30 minutes.

12.16.3.8

The extraction vessel shall be removed from the platform shaker and shall be placed in a sonicator for 20 minutes at a “no heat” condition.

12.16.3.9

Immediately after sonification has been concluded, the extraction vessel shall be vented by lifting the lid to prevent the creation of a vacuum within the vessel.

12.16.3.10

The specimens shall be allowed to rest in the extraction vessel until it has returned to room temperature after approximately 10–15 minutes.

12.16.3.11

The resulting solution in the extraction vessel shall be filtered using a glass vacuum filtration flask assembly, with a 45 mm (1.77 in.) glass fiber filter placed on the fritted surface of the filtration apparatus and the apparatus then clamped to the flask and connected to a laboratory vacuum line.

12.16.3.12

The glass filtration flask and specimen pieces shall be rinsed with 5 mL of extraction solvent.

12.16.3.13

Any excess solvent shall be squeezed from the specimen pieces into the filtration flask.

12.16.3.14

The liquid content of the vacuum filtration flask shall be transferred to an oil tube or other graduated condensation vessel suitable for measuring extract evaporation using a small glass funnel.

12.16.3.15

Modifications to the specimen extraction procedures provided in 12.15.3.1 through 12.15.3.13 shall be permitted, provided that extraction recovery average efficiencies of 80 percent or better can be demonstrated.

12.16.4 Preparation of Extract for Analysis.

12.16.4.1*

The condensation vessel and contents prepared as specified in 12.15.3 shall be placed on the rack under a miniature evaporator/concentrator that is connected to ultra-high-purity nitrogen, and the contents shall be evaporated to less than or equal to 2 mL.

A.12.16.4.1

This type of apparatus can either be fabricated or purchased. Multiple port evaporators/concentrators can be purchased or fabricated. A photograph of a fabricated miniature evaporator designed to hold oil tubes is shown in Figure A.12.15.4.1 .

Figure A.12.15.4.1 Photograph of a Miniature Evaporation Apparatus.



12.16.4.2

After reconstitution, the condensation vessel shall be placed in a vortex tube and vortexed 10–15 seconds to incorporate any solids that have dried on the side of the tube.

12.16.4.3

The contents of the vortex tube shall be measured using a disposable sterile pipette and the volume shall be recorded.

12.16.4.4

The contents of the vortex tube shall be returned to the oil tube with an appropriate amount of solvent to increase the final volume to 2 mL.

12.16.4.5

The oil tube shall be vortexed and the contents shall be transferred with a disposable glass pipette into 10 mL glass beaker.

12.16.4.6

The contents from the beaker shall be removed using a 3 mL syringe with an attached polyvinylidene fluoride (PVDF) 0.45 µm syringe.

12.16.4.7

The contents of the syringe shall be filled into auto-sampler vial.

12.16.4.8*

Alternative procedures for preparing the extract for analysis shall be permitted, provided that extraction recovery average efficiencies of 80 percent or better can be demonstrated.

A.12.16.4.8

EPA Method 3540C, "Soxhlet Extraction," can be adapted for use with textile sample matrices for performing this type of extraction for semivolatile organic compound contaminants.

12.16.5 Analysis of Specimens.

12.16.5.1

Calibration curves shall be prepared for each contaminant by applying known concentrations to specimen fabrics and extracting the specimens using the procedures specified in 12.15.3 and 12.15.4 using the analysis conditions specified in 12.15.5.2 .

12.16.5.2

Extracts prepared as specified in 12.15.4 shall be analyzed using gas chromatography and mass spectroscopy using the following analysis parameters:

A fused silica nonpolar 30 m, 0.25 mm ID, 0.50 µm mass spectroscopy column with a guard column that has been deactivated but not coated with stationary phase

Inlet temperature of 200°C (392°F)

Transfer line temperature of 300°C (572°F)

Ion source temperature of 300°C (572°F)

Oven temperature of 60°C (140°F); held for 2 minutes

Temperature ramp of 7°C (44.6°F) per minute to 310°C (590°F); held for 10 minutes

A carrier gas of ultra-high-purity helium at 1.2 L/min (40.6 oz)

1 µL sample splitless injection via autosampler into inlet containing split/splitless straight with wool topaz liner

12.16.5.3

The output from the gas chromatography and mass spectroscopy shall be used to integrate and calculate the concentration of each chemical per mass of specimen remaining with the percentage removal based on the calibration curves.

12.16.5.3.1

The concentration in each specimen shall be reported in µg/g specimen.

12.16.5.4

Cleaning efficiency shall be calculated for each contaminant with the following equation and as specified in 12.15.5.4.1 and 12.15.5.4.2 :

$$\text{cleaning efficiency} = 1 - \left[\frac{(C_C - C_M) - (C_W - C_P)}{(C_C - C_M)}\right] \times 100$$

[12.15.5.4]

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where:

C_C = contaminated specimen

C_M = material specimen (unwashed, not contaminated)

C_W = contaminated specimen (washed)

C_P = material specimen (washed, not contaminated)

12.16.5.4.1

The actual masses used in the calculation of cleaning efficiency shall be the specific measured concentration of contaminant.

12.16.5.4.2

If the measured mass is below the detection limit, a value of "0" shall be used.

12.16.5.5

The average cleaning efficiency shall be determined for all contaminants.

12.16.5.5.1

If any cleaning efficiencies are indicated as being above 100 percent, a cleaning efficiency of 100 percent shall be used for the purpose of calculating the average cleaning efficiency.

12.16.5.5.2

If any cleaning efficiencies are indicated as being below 0 percent, a cleaning efficiency of 0 percent shall be used for the purpose of calculating the average cleaning efficiency.

12.16.5.5.3

If any analytical anomaly that cannot be rationalized on the basis of the data set and other measurements is encountered for the analysis of a specific contaminant, discarding one contaminant from the calculation of the average cleaning efficiency shall be permitted.

12.16.5.6*

Alternative procedures for the analysis of specimens specified in 12.15.5.1 through 12.15.5.3 shall be permitted, provided that the procedures take the concentrations of the controls into account by providing sufficient sensitivity to allow for the measurement of a 1.0 percent difference or lower in cleaning efficiency.

A.12.16.5.6

EPA Method 8270E, "Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)," can be adapted for use with textile sample matrices for performing this type of analysis for semivolatile organic compound contaminants.

12.17 Heavy Metal Contaminated Specimen Preparation, Extraction, and Analysis.

12.17.1 Selection of Contaminants.

12.17.1.1

A certified solution shall be obtained that contains the following metals, each at a concentration of 100 ppm:

- Antimony
- Arsenic
- Cadmium
- Chromium
- Cobalt
- Lead

12.17.1.2

Alternative techniques for preparing a mixture of the target heavy metal contaminants shall be permitted if it can be demonstrated that the heavy metal concentrations are 100 ppm ± 10 ppm.

12.17.2 Procedures for Contamination of Specimens.

12.17.2.1

All handling of specimens and metal solutions shall be performed while wearing disposable gloves. Use of glassware for contamination or extraction shall not be permitted as the use of these items can lead to cross contamination.

12.17.2.2

Outer shell fabric prepared as specified in 12.4.3.2 shall be cut into 25 mm × 50 mm (1 in. × 2 in.) specimens, and the weight of each specimen shall be recorded in grams to the nearest 0.001 g.

12.17.2.3*

Using tweezers, one specimen shall be horizontally placed on a wire rack or other suitable support structure that minimizes the contact of the bottom surface of the specimens with the table or counter service.

A.12.17.2.3

A metal wire test tube rack can be used for this purpose.

12.17.2.4

A volume of 1.0 mL of a 100 ppm metals standard solution shall be pipetted onto each fabric specimen.

12.17.2.4.1

The operator shall ensure that the specimen is at the bottom of the plastic tube and sufficiently wetted by the metals standard solution.

12.17.2.4.2

A total volume of 500 µL of the metals standard solution shall be pipetted and allowed to dry before pipetting the remaining 500 µL.

12.17.2.4.3*

The operator shall ensure that all applied metals standard solution remains on the specimen.

A.12.17.2.4.3

Given the hydrophobic nature of original finish on the specimens, extreme care must be exercised that no liquid runs off the specimen during the application of the metals standard solution.

12.17.2.4.4

Contaminated specimens shall be permitted to be dried in an oven at 50°C ± 5°C for up to 60 minutes.

12.17.2.5

The weight of the contaminated specimens shall be recorded in grams to the nearest 0.001 g.

12.17.2.6

After the specimens have been allowed to fully dry, plastic tweezers shall be used to insert specimens into metal-free plastic tubes.

12.17.2.7

The amount of standard solution on the specimen shall be verified using the following equation:

$$\text{amount of standard solution applied } (\mu g) = \left[\text{final specimen weight } (g) - \text{initial specimen weight } (g)\right] \times 1000\ \mu g/g$$

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[12.16.2.7]

12.17.3 Extraction of Specimens.

12.17.3.1 Acid Digestion.

12.17.3.1.1

Each specimen shall be added to an individual PFA microwave reaction vessel.

12.17.3.1.2

A volume of 10 mL (⅓ oz) concentrated nitric acid, approximately 70 percent weight/volume, shall be added to each PFA reaction vessel.

12.17.3.1.3

Each PFA reaction vessel shall be microwaved at 1600 W, 90 percent power, for 20 minute at 170°C (338°F) and held for 30 minutes for a total 50-minute cycle.

12.17.3.1.4

The specimens in the PFA reaction vessels shall be allowed to cool for approximately 30 minutes.

12.17.3.1.5*

Modifications to the specimen acid digestion procedures provided in 12.16.3.1.1 through 12.16.3.1.4 shall be permitted, provided that extraction recovery average efficiencies of 90 percent or better can be demonstrated.

A.12.17.3.1.5

EPA Method 3050B, "Acid Digestion of Sediments, Sludges, and Soils," can be adapted for use with textile sample matrices for performing this type of extraction for heavy metal contaminants.

12.17.3.2 Filtration.

12.17.3.2.1

The gravitation filtration system shall be set up using a grade 40 quantitative ashless (0.007 percent ash maximum) filter paper and plastic beakers for the filter solution.

12.17.3.2.2

The PFA microwave reaction vessel shall be carefully opened in the vent hood away from lab technicians due to the potential release of nitric acid fumes.

12.17.3.2.3

A volume of 10 mL (⅓ oz) deionized water shall be added to the microwave reaction vessel and the reaction vessel shall be turned over three times.

12.17.3.2.3.1

The reaction vessel shall be permitted to "breathe" if needed by opening the lid to off-gas.

12.17.3.2.4

Deionized water and the acid-digested sample mixture shall be poured into the filter setup.

12.17.3.2.5

The addition of deionized water shall be repeated to microwave reaction vessel two more times, for a total of 30 mL deionized water rinsed through microwave reaction vessel.

12.17.3.2.6

The resulting solution shall be filtered thoroughly once, then a second time, rinsing the filter paper with a small amount (<5 mL) of deionized water both times.

12.17.3.2.7

Each sample solution shall be brought to a volume of 40 mL (1.35 oz) volume using deionized water.

12.17.3.2.8

The sample solution shall be vortexed.

12.17.3.2.9*

Modifications to the specimen filtration procedures provided in 12.16.3.2.3.1 through 12.16.3.2.8 shall be permitted, provided that extraction recovery average efficiencies of 80 percent or better can be demonstrated.

A.12.17.3.2.9

EPA Method 3050B, "Acid Digestion of Sediments, Sludges, and Soils," can be adapted for use with textile sample matrices for performing this type of extraction for heavy metal contaminants.

12.17.3.3 Instrument Sample Preparation.

12.17.3.3.1

An internal standard shall be prepared in a 100 mL (3.38 oz) volumetric flask to receive 10 ppb using the following constituents:

2 percent nitric acid

0.2 mL of 100 ppm Ga

0.2 mL of 100 ppm In

0.2 mL of 100 ppm La

12.17.3.3.2

A 1 mL volume of the extracted sample and a 25 µL volume of the internal standard shall be added to a 10 mL volumetric flask and diluted to volume with 2 percent nitric acid, and the resultant sample shall be vortexed.

12.17.3.3.3

A 10 mL (⅓ oz) sample of each instrument calibration standard shall be prepared at the following concentrations using 2 percent nitric acid to bring volume to 10 mL (⅓ oz):

0 ppb (to serve as blank)

100 ppb

1 ppm

10 ppm

100 ppm

12.17.3.3.4

The internal standard shall be added.

12.17.3.3.4.1

Once the test method recovery is established, the use of the internal standard shall be permitted to be optional.

12.17.3.3.5

All samples shall be vortexed.

12.17.3.3.6

Alternative sample preparation up procedures in lieu of 12.16.3.3.2 and 12.16.3.3.3 shall be permitted if a suitable scheme for demonstrating calibration of the respective metals achieved a linear correlation coefficient of 0.90 or better.

12.17.4 Analysis of Specimens.

12.17.4.1 Instrumentation Set-Up.

12.17.4.1.1

An inductively coupled plasma-mass spectrometer (ICP-MS) shall be prepared using the following method parameters to include those metals of interest:

Sweeps/readings: 20

Readings/replicates: 1

Number of replicates: 3

Dwell time: 50.0 ms

Mode: KED

RPq: 0.25

Detector mode: Dual

Measurement units: Counts

Automatic lens: On

Spectral peak processing: Sum

Signal profile processing

Baseline readings: 0

Smoothing: Yes, Factor 5

12.17.4.1.2

The blank, all samples, and instrument calibration standards shall be run on ICP-MS.

~~12.17.4.1.3*~~

~~An alternative analytical technique shall be permitted if it demonstrates sensitivity to the respective metals to a minimum of 100 ppb, provides for a linear calibration for determining each metal concentration with a correlation coefficient of 0.90 or better, and permits the ability for discerning a difference of 1.0 percent or lower in cleaning efficiency.~~

~~A.12.17.4.1.3~~

~~EPA Method 6010D, "Inductively Coupled Plasma," can be adapted for use with textile sample matrices for performing this type of analysis for heavy metal contaminants.~~

~~12.17.4.2 Data Analysis.~~

~~12.17.4.2.1~~

~~The slope, intercept, and regression coefficient shall be calculated using standard metal solutions (0 ppb–100 ppm).~~

~~12.17.4.2.2~~

~~The calculated slope and intercept shall be used to calculate the concentration of each individual metal each digested fabric swatch (ppb) in the 10 mL vial described in 12.16.3.3.1 using the following equation:~~

$$\text{metal concentration (ppb)} = \frac{\text{metal ion counts} - \text{metal ion intercept}}{\text{metal ion slope}}$$

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~~[12.16.4.2.2]~~

~~12.17.4.2.3~~

~~The calculated concentration in ppb shall be used to calculate the mass in µg of each metal in the original 40 mL vial described in 12.16.3.3.3 .~~

~~12.17.4.2.3.1~~

~~A correction factor of 0.401 shall be used as calculated by the two dilution factors in the following equation:~~

$$0.010025\ \text{L} \times 0.040\ \text{L} = 0.000401\ \text{L}$$

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~~[12.16.4.2.3.1~~

~~12.17.4.2.4~~

~~The blank and blank specimen from each contaminated specimens shall be subtracted.~~

~~12.17.4.2.5~~

~~The cleaning efficiency shall be calculated using the following equation:~~

$$\text{cleaning efficiency} = \frac{\mu\text{g metals}_i - \mu\text{g metals}_f}{\mu\text{g metals}_i} \times 100 \text{ percent}$$

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~~[12.16.4.2.5]~~

~~12.17.4.2.5.1~~

~~If any cleaning efficiencies are indicated as being above 100 percent, a cleaning efficiency of 100 percent shall be reported.~~

~~12.17.4.2.5.2~~

~~If any cleaning efficiencies are indicated as being below 0 percent, a cleaning efficiency of 0 percent shall be reported.~~

12.17.4.2.5.3

If any analytical anomaly that cannot be rationalized on the basis of the data set and other measurements is encountered for the analysis of a specific contaminant, discarding one contaminant from being reported and interpreted for the determination of heavy metal cleaning efficiencies shall be permitted.

12.17.4.2.6

The percent recovery shall be calculated using the following equation:

$$\frac{\mu g \text{ extracted}}{\mu g \text{ deposited onto individual fabric swatch}} \times 100 \text{ percent}$$

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[12.16.4.2.6]

12.18 Bacterial Contaminated Specimen Preparation, Extraction, and Analysis.

12.18.1 Preparation of Test Microorganisms.

12.18.1.1

Testing shall be performed in accordance with Section 9 of ASTM E2274, *Standard Test Method for Evaluation of Laundry Sanitizers and Disinfectants* , with the following modifications:

The test microorganisms shall be *Klebsiella pneumoniae* (ATCC 4352) and *Staphylococcus aureus* (ATCC 6538).

A soil load shall not be added to the inoculum.

12.18.1.2*

Modifications in the procedures for the preparation of test microorganisms shall be permitted if the laboratory can demonstrate viability of alternate procedures used to prepare cultures for both *Klebsiella pneumoniae* (ATCC 4352) and *Staphylococcus aureus* (ATCC 6538) to be used in the contamination step specified in 12.17.2 .

~~A.12.18.1.2~~

In the preparation, extraction, and analysis of bacterial contaminated specimens, references are made to ASTM E2274, *Standard Test Method for Evaluation of Laundry Sanitizers and Disinfectants* , which are intended to provide procedures for carrying out verification of sanitization procedures in inactivating or neutralizing specific bacterial contamination. Due to the generalized nature of the ASTM E2274 procedures, particularly as applied to evaluating sanitizers under ideal exposure conditions, the following guidance is offered to provide specific recommended procedures for meeting the requirements in Section 12.18 .

Preparation of media, specimens, and inoculation of specimens as follows:

- Grow a culture of the needed bacteria per accepted ATCC culture methods.
- Prepare 6 plates of appropriate agar media for each of the bacteria used in 100 mm (4 in.) slippable petri dishes for the contaminated swatches and 1 more plate per bacterium for the noncontaminated swatches.
- Perform a serial dilution of the culture and plate 200 µL of the -4, -5, and -6 to determine the concentration.
- Use the initial bacterial concentration to determine the concentration in the inoculation amount.
- Sterilize all specimens to be used in testing with a suitable sterilization technique.
- Label all petri dishes.
- Use aseptic techniques when placing all specimens in their corresponding petri dishes.
- Negative control (lab and travel control) dishes should be performed first and must be covered with parafilm and placed directly into the refrigerator at 4°C (39°F).
- Contaminate specimens with each bacterium separately to reduce cross-contamination possibilities.

Once all the contaminated specimens have been inoculated, carefully place the petri dish into the incubator set to the same growth temperature for that bacteria.

Allow the specimens to remain in the incubator until completely dry (continually check as over drying can cause low recovery results in positive controls).

Once the specimens are dry, apply parafilm on all petri dishes except the contaminated laboratory control for each bacterium and place in the refrigerator.

Ship out the necessary specimens on ice for laundering.

Contaminated Lab Control Analysis as follows:

- Place 10 mL of broth (same as growth medium used in culturing each bacterium) into three appropriate containers with lids.
- Label the 3 containers with bacterium name then “(+)”, “(+) 10x”, and “(+) 100x” respectively.
- Place the dry contaminated lab control into the container marked (+) and vortex or shake (depending on the size of the container) for 1 minute.
- Once the time is up, aliquot 1 mL of the (+) into the (+) 10x and 0.1 mL of the (+) into the (+) 100x and vortex or shake for 1 minute.
- Label the 6 agar media plates that were prepared for each bacterium with the bacteria name then “ 3” with “(+) 10x” and “3” with “(+) 100x”.
- Spread plate 0.2 mL on each of the respective plates for the 10x and 100x samples and allow to dry before incubating the samples.
- Determine the colony forming units (CFUs) and record individual results for all plates.

Noncontaminated Lab Control Analysis as follows:

Place 10 mL of broth (same as growth medium used in culturing each bacterium) into an appropriate container with a lid.

Label the container with "(-)".

Place the swatch into the broth container and vortex or shake for 1 minute.

Label 1 agar plate per bacterium with "(-)".

Spread plate 0.2 mL from the (-) labeled container and allow to dry before incubating.

Test Specimen Analysis as follows:

Process each bacterium separately to reduce contamination possibilities.

Prepare agar media plates for each bacterium so that each test specimen gets 3 plates (47 mm petri dishes).

Prepare 3 containers with 10 mL of appropriate broth for each bacterium for each test specimen.

Label the containers and agar plates with specimen code then "1", "10", and "100" respectively.

Aseptically place the test specimen into the container with the 1 and vortex or shake for 1 minute.

Add 1 mL of the solution made in (5) to the container labeled 10, then add 0.1 mL of the solution made in (5) to the container labeled 100, and vortex or shake both dilutions for 1 minute.

Once all test specimens have been processed and their dilutions been made, use a vacuum filtration system to filter all the test specimens and their dilutions onto filters.

Plate these filters on the corresponding prepared 47 mm agar media plates and incubate.

Determine the colony forming units (CFUs) and record individual results for all plates.

Travel Noncontaminated Specimen Analysis as follows:

Process noncontaminated specimens that travel to the sanitization facility location in same way as the noncontaminated lab controls.

Travel Contaminated Specimen Analysis as follows:

Process contaminated specimens that travel to the sanitization facility location in the same way as the contaminated laboratory controls.

Sterilizer Check Specimens as follows:

Process sterilizer check specimens in the same way as the noncontaminated laboratory controls once these swatches are subjected to the same sterilizing cycle that was used for the garments and individual specimens.

12.18.2 Procedures for Contamination of Specimens.

12.18.2.1

All handling of specimens and metal solutions shall be performed while wearing disposable gloves.

12.18.2.2

Outer shell fabric prepared as specified in 12.14.3.2 shall be cut into 25 mm × 38 mm (1 in. × 1.5 in.) specimens.

12.18.2.2.1

An additional outer shell specimen shall be prepared as specified in 12.17.2.2 for the verification of the sterilization process specified in 12.17.2.3 and subjected to suitable sterilization assurance procedures.

12.18.2.3

The outer shell specimens shall be wrapped in aluminum protective foil and autoclaved for 90 minutes at 121°C (250°F).

12.18.2.4

Each specimen to be contaminated shall be inoculated with 0.03 mL of the prepared inoculum for the respective type of bacteria by dispersing the inoculum in such a way that covers as much of the specimen area as possible.

12.18.2.4.1

Individual specimens shall be inoculated with only one type of bacteria.

12.18.2.5

The contaminated specimens shall be placed in an individual petri dish and incubated at 37°C (98.6°F) for 30 minutes.

12.18.2.6

Following incubation, the specimen shall be kept in a refrigerator at 4°C (39°F) until ready for shipping.

12.18.2.7*

Modifications to the procedures in 12.17.2.1 and 12.17.2.2 for the contamination of specimens shall be permitted if the laboratory can demonstrate consistency of bacterial counts as part of alternative procedures in the preparation of contaminated specimens for each bacterium.

A.12.18.2.7

See A.12.17.1.2 .

12.18.3 Analysis of Specimens for Bacterial Contamination.

12.18.3.1

Specimens shall be analyzed for bacterial contamination in accordance with Sections 12.12, 13, and 15 of ASTM E2274, *Standard Test Method for Evaluation of Laundry Sanitizers and Disinfectants* , with the following modifications:

A 5-hour threshold shall be used to calculate the initial concentration of viable bacterial cells attached to the specimen that could not be estimated at the initial inoculation.

A polymerase chain reaction (PCR) detection method shall be permitted to be used to identify and quantify the levels of microorganisms present on the test specimens.

Viable bacterial levels shall be determined by colony-counting techniques for establishing the number of colony forming units (CFU).

A minimum average of 1.0×10^3 CFU/specimen shall be able to be recovered for a valid test.

12.18.3.2

The log $_{10}$ reduction shall be determined using the following steps:

The average bacterial count for contaminated specimens that were subjected to sanitization will be determined separately for each bacterium and shall be converted to a log $_{10}$ value.

The bacterial count for the contaminated, traveling specimen shall be converted to a log $_{10}$ value.

The log $_{10}$ reduction shall be calculated using the equation below:

$$\log_{10}\text{ reduction} = \log_{10}(\text{contaminated, traveling}) - \log_{10}(\text{average contaminated, sanitized})$$

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[12.17.3.2]

The log $_{10}$ value for the bacterial count of the contaminated, control specimens shall be permitted to be used in place of the contaminated, travel specimen, subject to the requirement in 12.14.4.4.1 (1).

12.18.3.3

Other control specimens including the noncontaminated specimens shall be used to assess the viability of the procedures and the potential for cross-contamination with foreign bacteria as needed to determine log $_{10}$ reduction due to the application of sanitization procedures.

12.18.3.4*

Modifications to the analysis procedures provided in 12.17.3.1 through 12.17.3.3 shall be permitted if the alternative methods are able to achieve viable bacterial counts in specimens subjected to the sanitization process for determination of log $_{10}$ reductions for the "sanitized" contaminated specimens as compared to the contaminated, traveling specimens.

A.12.18.3.4

See A.12.17.1.2 .

12.19 Preparation and Handling of Contaminated Specimens and Surrogate Clothing.

12.19.1 Preparation of Surrogate Garments.

12.19.1.1

Surrogate garment outer shells shall be made from an undyed 60 percent para-aramid/40 percent polybenzimidazole (PBI) base fabric with a reinforcement grid meeting the following specifications:

The outer shell fabric shall have a unit area weight of 240 g/m ^{2} to 268 g/m ^{2} (7.1 oz/yd ^{2} to 7.9 oz/yd ^{2}).

The outer shell fabric shall have a thickness of 0.584 mm ± 0.254 mm (0.023 in. ± 0.10 in.).

The outer shell fabric shall have a water absorption resistance of less than 5 percent when tested in pristine condition in accordance with Section 8.25 of NFPA 1971 , incorporated in the 2024 edition of NFPA 1970 .

12.19.1.2

Fabric used for the creation of the sample mesh pockets on each garment shall be an aramid-based, warp-knit, mesh-style fabric having an open area of 20 to 40 percent and a unit area weight ranging from 220 g/m ^{2} to 270 g/m ^{2} (6.5 oz/yd ^{2} to 8.0 oz/yd ^{2}).

12.19.1.3

Surrogate garments shall consist of a surrogate coat and surrogate pants.

12.19.1.4

Surrogate coats shall be made from a single layer of outer shell fabric using appropriate seams, finished edges, and mesh pockets with thread that complies with the respective requirements of NFPA 1971 (incorporated in the 2024 edition of NFPA 1970) and shall be fabricated as shown in Figure 12.18.1.4 with the following additional specifications:

Surrogate coats shall be prepared with a body width of 74 cm ± 5 cm (29 in. ± 2 in.) and a sleeve length of 47 cm ± 5 cm (18 ½ in. ± 2 in.) when measured from the top of coat seam to the end of the sleeve hem.

Surrogate coats shall not have front closures, collars, coat sleeve end reinforcements, hardware, or any other materials not specified in this section.

Each surrogate coat shall have a 254 mm × 254 mm (10 in. × 10 in.) outer shell pocket positioned on the front lower left side of the garment, approximately 50 mm (2 in.) from the bottom hem and 50 mm (2 in.) from the left side seam, that is secured using a double needle seam and has a top finished edge with a 152 mm (6 in.) strip of hook-and-loop closure to secure the top of the pocket.

Each surrogate coat shall have a 75 mm (3 in.) wide strip of reflective trim compliant with the respective requirements of NFPA 1971 (incorporated in the 2024 edition of NFPA 1970), sewn 75 mm (3 in.) above the bottom hem of the coat and on each sleeve at 75 mm (3 in.) above the bottom edge of the sleeve end.

Each surrogate coat shall have three 152 mm × 152 mm (6 in. × 6 in.) sample mesh pockets in accordance with the following requirements:

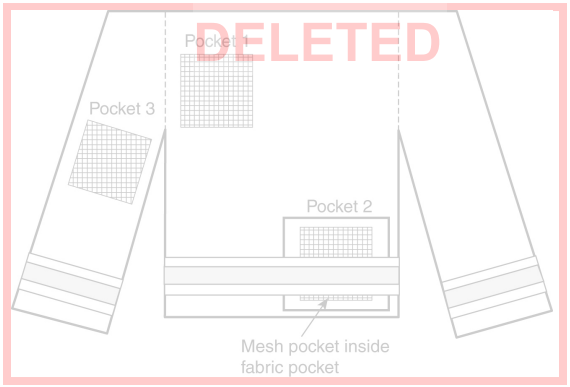
The pockets shall be positioned on the front of the garment and numbered as indicated in Figure 12.18.1.4 .

One pocket shall be positioned on top right side (Pocket 1), a second pocket shall be positioned in the center inside of the lower left side pocket (Pocket 2), and a third pocket shall be positioned on the upper right sleeve (Pocket 3).

The openings of all three pockets shall be oriented toward the top.

The pockets shall include a 101 mm (4 in.) strip of 21 mm (0.8125 in.) hook-and-loop tape for securing the open end of the pocket.

Figure 12.19.1.4 Design and Locations of Sample Mesh Pockets on Surrogate Coats.



12.19.1.5

Surrogate pants shall be made from a single layer of outer shell fabric using appropriate seams, finished edges, and mesh pockets with thread that complies with the respective requirements of NFPA 1971 , incorporated in the 2024 edition of NFPA 1970 , and shall be fabricated as shown in Figure 12.18.1.5 with the following additional specifications:

Surrogate pants shall be prepared with a 56 cm ± 5 cm (22 in. ± 2 in.) width at the garment waist and an inseam length of 76.2 cm ± 5.0 cm (30 in. ± 2 in.) as measured from the garment crotch to the bottom of the pant leg hem.

Surrogate pants shall not have fly closures, suspender hardware, pant hem reinforcements, other hardware, or any other materials not specified in this section.

Each surrogate pant shall have a 254 mm × 254 mm (10 in. × 10 in.) outer shell pocket positioned in the middle of the upper right leg of the garment that is secured using a double needle seam and has a top finished edge with a 152 mm (6 in.) strip of hook-and-loop closure to secure the top of the pocket.

Each surrogate pant shall have a 254 mm × 254 mm (10 in. × 10 in.) coated outer shell fabric reinforcement in the middle of left leg that is secured using a double needle seam and has a top finished edge with a 152 mm (6 in.) strip of hook-and-loop closure to secure the top of the reinforcement.

Each surrogate pant shall have a 75 mm (3 in.) wide strip of reflective trim compliant with the respective requirements of NFPA 1971 , incorporated in the 2024 edition of NFPA 1970 , attached circumferentially around each lower leg of the garment at 75 mm (3 in.) above the bottom hem of the leg.

Each surrogate pant shall have three 152 mm × 152 mm (6 in. × 6 in.) sample mesh pockets in accordance with the following requirements:

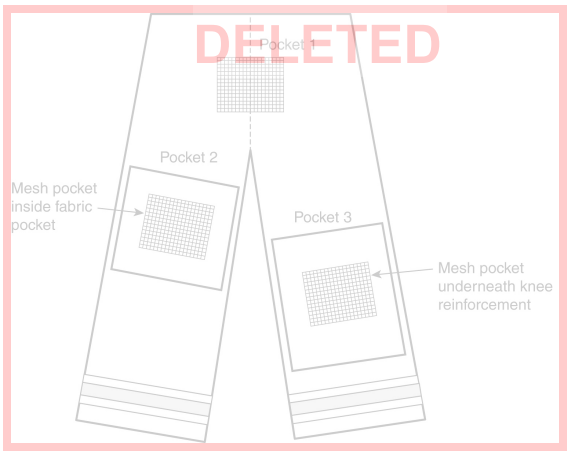
The pockets shall be positioned on the front of the garment.

One pocket shall be positioned in the middle approximately 101 mm (4 in.) from the waistline (Pocket 1), a second pocket shall be centered inside of the right leg outer shell pocket (Pocket 2), and a third pocket shall be centered inside of the left knee reinforcement pocket (Pocket 3).

The openings of all three pockets shall be oriented toward the top, as shown in Figure 12.18.1.5 .

The pockets shall include a 101 mm (4 in.) strip of 21 mm (0.8125 in.) hook-and-loop tape for securing the open end of the pocket.

Figure 12.19.1.5 Design and Locations of Sample Mesh Pockets on Surrogate Pants.



12.19.1.6

Surrogate garments shall be subjected to an advanced cleaning by the verification organization prior to use by the cleaning facility.

12.19.2 Preparation of Ballast Fabric-Based Wash Panels.

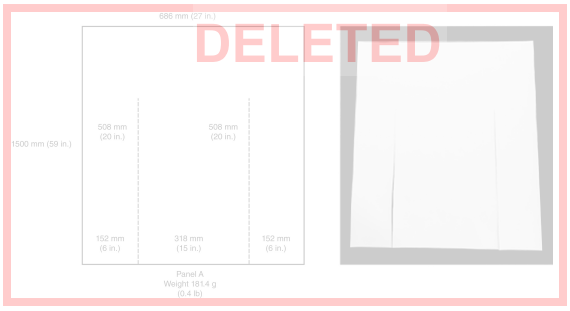
12.19.2.1

Four different ballast fabric–based wash panels — Panel A, Panel B, Panel C, and Panel F — shall be prepared from the ballast materials specified in 12.4.14.2 according to the instructions provided in 12.18.2.2 through 12.18.2.5 . All panel edges shall be unfinished. Panel D shall be the surrogate coat and Panel E shall be the surrogate pants prepared according to 12.18.1 .

12.19.2.2

Panel A shall be a 686 mm × 686 mm (27 in. × 27 in.) square with two 508 mm (20 in.) slits set 152 mm (6 in.) from each edge as shown in Figure 12.18.2.2 .

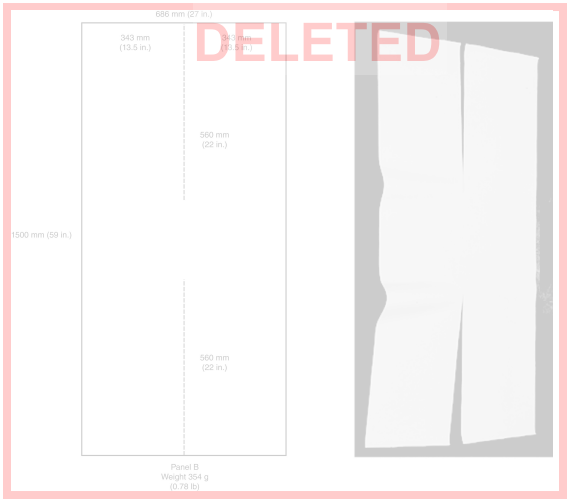
Figure 12.19.2.2 Specifications and Photograph for Panel A.



12.19.2.3

Panel B shall be a 686 mm × 1500 mm (27 in. × 59 in.) rectangle with two bisecting 560 mm (22 in.) slits originating from opposite sides on the shorter dimensions of the shape as shown in Figure 12.18.2.3 .

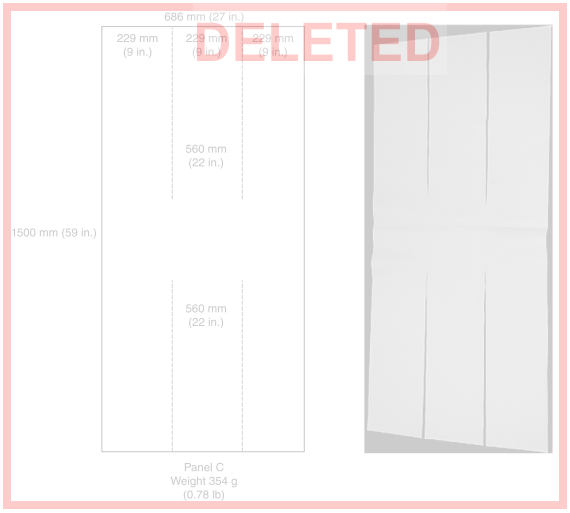
Figure 12.19.2.3 Specifications and Photograph for Panel B.



~~12.19.2.4~~

~~Panel C shall be a 686 mm × 1500 mm (27 in. × 59 in.) rectangle with two sets of two bisecting 560 mm (22 in.) slits originating from opposite sides on the shorter dimensions of the shape, spaced at 229 mm (9 in.) intervals from each edge and from each other, as shown in Figure 12.18.2.4 .~~

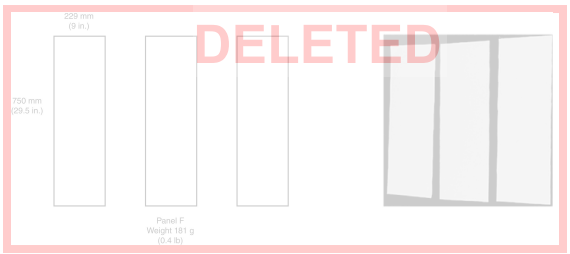
~~Figure 12.19.2.4 Specifications and Photograph for Panel C.~~



~~12.19.2.5~~

~~Panel F shall be a total of three rectangular panels that measure 228 mm × 750 mm (9 in. × 29.5 in.) as shown in Figure 12.18.2.5 .~~

~~Figure 12.19.2.5 Specifications and Photograph for Panel F.~~



~~12.19.2.6~~

~~Panel D shall be depicted as shown in Figure 12.18.2.6 .~~

~~Figure 12.19.2.6 Diagram and Photograph for Panel D.~~



12.19.2.7

Panel E shall be depicted as shown in Figure 12.18.2.7 .

Figure 12.19.2.7 Diagram and Photograph for Panel E.



12.19.3 Preparation of Wash Load.

12.19.3.1

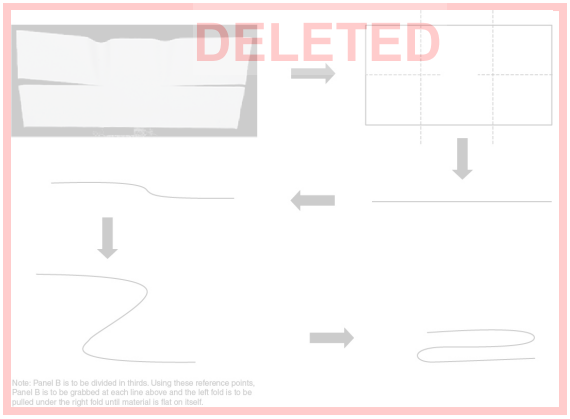
Panel A shall be folded and placed into the wash load as shown in Figure 12.18.3.1 .

Figure 12.19.3.1 Steps for Folding and Placing Panel A into Wash Load.

12.19.3.2

Panel B shall be folded and placed into the wash load as shown in Figure 12.18.3.2 .

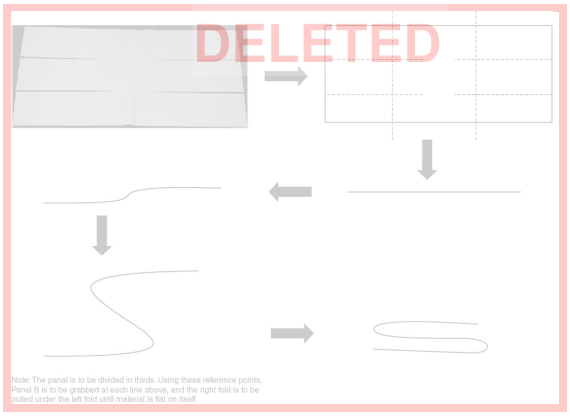
Figure 12.19.3.2 Steps for Folding and Placing Panel B into Wash Load.



~~12.19.3.3~~

~~Panel C shall be folded and placed into the wash load as shown in Figure 12.18.3.3 .~~

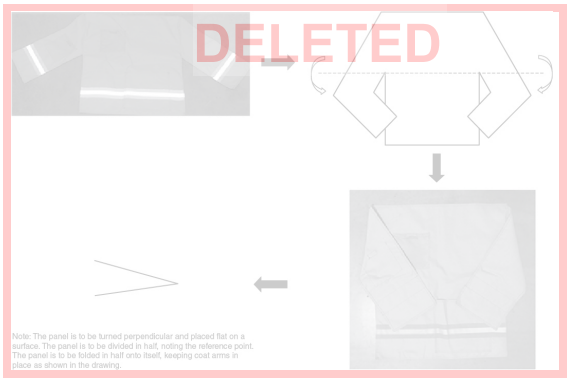
~~Figure 12.19.3.3 Steps for Folding and Placing Panel C into Wash Load.~~



~~12.19.3.4~~

~~Panel D shall be folded and placed into the wash load as shown in Figure 12.18.3.4 .~~

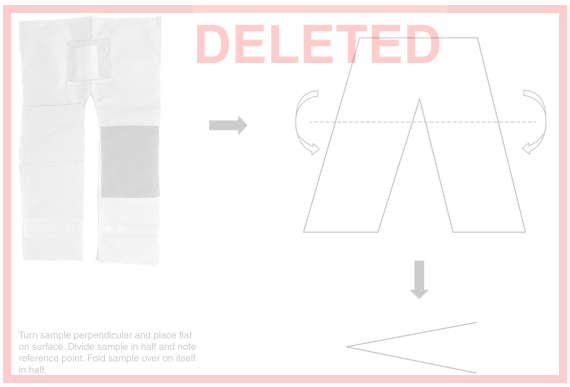
~~Figure 12.19.3.4 Steps for Folding and Placing Panel D into Wash Load.~~



~~12.19.3.5~~

~~Panel E shall be folded and placed into the wash load as shown in Figure 12.18.3.5 .~~

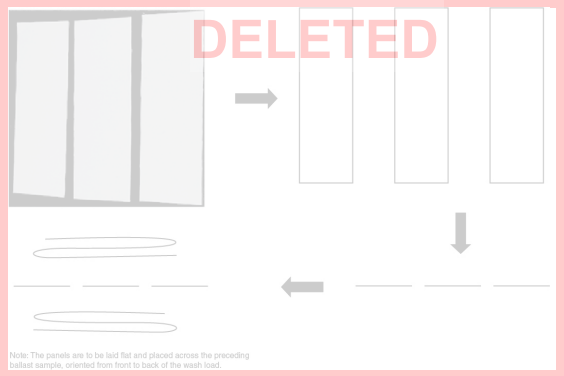
~~Figure 12.19.3.5 Steps for Folding and Placing Panel E into Wash Load.~~



~~12.19.3.6~~

~~Panel F shall be folded and placed into the wash load as shown in Figure 12.18.3.6 .~~

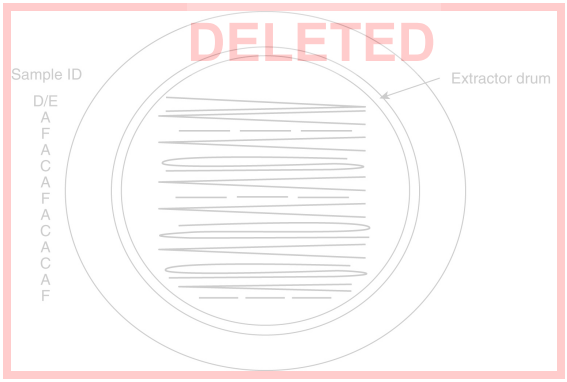
~~Figure 12.19.3.6 Steps for Folding and Placing Panel F into Wash Load.~~



~~12.19.3.7~~

~~The panels shall be placed in the washer/extractor according to the sequence provided in Figure 12.18.3.7(a) , starting at the bottom, and depicted in Figure 12.18.3.7(b) through Figure 12.18.3.7(f) .~~

~~Figure 12.19.3.7(a) Sequence for Placing Panels in Washer/Extractor Drum.~~



~~Figure 12.19.3.7(b) Placement of Panel F (3 Pieces) into Washer/Extractor Drum.~~



~~Figure 12.19.3.7(c) Placement of Panel C into Washer/Extractor Drum.~~



~~Figure 12.19.3.7(d) Placement of Panel A into Washer/Extractor Drum.~~



~~Figure 12.19.3.7(e) Placement of Panel D into Washer/Extractor Drum.~~



Figure 12.19.3.7(f) Placement of Panel E into Washer/Extractor Drum.



12.19.3.7.1

It shall be permitted to place the wash load with all of the panels at a 90-degree angle with respect to their orientations shown in 12.18.3.7 .

12.19.3.8*

The sequencing of panels shall be as follows:

The sequencing shall be repeated for attaining a wash load with the mass capacity, ± 5 percent, as specified by the cleaning facility.

Panel D and Panel E shall be alternated in the sequencing.

A total of three panels each shall be used for Panel D and Panel E.

Panel D and Panel E shall alternatively be evenly distributed within the wash load so that there are a near equal number of nonsurrogate panels between each surrogate garments (Panel D or Panel E).

It shall be permissible to adjust the sequence of the panels to meet the requirements of 12.18.3.8 (1) through 12.18.3.8 (4) in order to attain the target wash load mass capacity.

~~A.12.19.3.8~~

Specific examples of samples (panels) are given below for set size washer/extractors in Table A.12.18.3.8(a) through Table A.12.18.3.8(c). These tables are intended to provide examples for how Panel D and Panel E are alternated and distributed with the respective wash loads. The specific panel weight can vary based on cutting practices and use over time.

Examples of recommended sequences for the individual panels for a 40 lb, a 60 lb, and a 100 lb washer/extractor load at 80 percent capacity are provided in Table A.12.18.3.8(d).

Table A.12.18.3.8(a) Number and Type of Panels for 40 lb Washer/Extractor Load at 80 Percent Capacity

Panel	Number	Individual Weight		Total Weight	
		g	lb	kg	lb
A	28	172	0.38	5.08	11.20
B	9	354	0.78	3.27	7.20
C	9	354	0.78	3.27	7.20
D	3	354	0.78	1.06	2.34
E	3	354	0.78	1.06	2.34
F (3 pieces)	15	181	0.40	0.91	2.00
Total load weight	—	—	—	14.65	32.28

Table A.12.18.3.8(b) Number and Type of Panels for 60 lb Washer/Extractor Load at 80 Percent Capacity

Panel	Number	Individual Weight		Total Weight	
		g	lb	kg	lb
A	42	172	0.38	7.62	16.80
B	12	354	0.78	4.35	9.60
C	16	354	0.78	5.66	12.50
D	3	354	0.78	1.06	2.34
E	3	354	0.78	1.06	2.34
F (3 pieces)	27	181	0.40	1.63	3.60
Total load weight	—	—	—	21.38	47.18

Table A.12.18.3.8(c) Number and Type of Panels for 100 lb Washer/Extractor Load at 80 Percent Capacity

Panel	Number	Individual Weight		Total Weight	
		g	lb	kg	lb
A	70	172	0.38	12.07	26.60
B	20	354	0.78	7.08	15.60
C	32	354	0.78	11.03	24.32
D	3	354	0.78	1.06	2.34
E	3	308	0.68	1.06	2.34
F (3 pieces)	13	181	0.40	2.36	5.20
Total load weight	—	—	—	34.66	76.40

Table A.12.18.3.8(d) Recommended Sequencing for Individual Panels

Step Sequence	Extractor Load		
	40 lb	60 lb	100 lb
1	D	D	D
2	A	A	A
3	C	F	C
4	A	A	A
5	F	C	F
6	A	A	A
7	B	F	B
8	A	A	A
9	C	B	C
10	A	A	A
11	E	C	C
12	A	A	A
13	B	F	B
14	A	A	A
15	C	E	C
16	A	A	A
17	F	B	F
18	A	A	A
19	B	C	B
20	A	A	A
21	C	F	C
22	A	A	A
23	D	C	E
24	A	A	A
25	B	B	B
26	A	A	A
27	C	C	C
28	A	A	A
29	E	F	C
30	A	A	A
31	B	D	B
32	A	A	A
33	C	B	C
34	A	A	A
35	F	C	F
36	A	A	A
37	B	F	B
38	A	A	A
39	C	C	C
40	A	A	A
41	D	B	D

Step Sequence	Extractor Load		
	40 lb	60 lb	100 lb
42	A	A	A
43	B	C	B
44	A	A	A
45	C	E	C
46	A	A	A
47	E	C	C
48	A	A	A
49	B	B	B
50	A	A	A
51	C	C	C
52	A	A	A
53	F	F	F
54	A	A	A
55	B	C	B
56	A	A	A
57	F	B	F
58	A	A	A
59	C	C	C
60	—	A	B
61	—	D	A
62	—	A	C
63	—	C	A
64	—	A	F
65	—	B	A
66	—	A	B
67	—	C	A
68	—	A	C
69	—	F	A
70	—	A	C
71	—	C	A
72	—	A	E
73	—	B	A
74	—	A	C
75	—	E	A
76	—	A	F
77	—	C	A
78	—	A	B
79	—	F	A
80	—	A	C
81	—	B	A
82	—	A	C

Step Sequence	Extractor Load		
	40 lb	60 lb	100 lb
83	—	C	A
84	—	A	B
85	—	F	A
86	—	A	C
87	—	B	A
88	—	C	C
89	—	B	A
90	—	—	B
91	—	—	A
92	—	—	C
93	—	—	A
94	—	—	F
95	—	—	A
96	—	—	D
97	—	—	A
98	—	—	C
99	—	—	A
100	—	—	C
101	—	—	A
102	—	—	B
103	—	—	A
104	—	—	C
105	—	—	A
106	—	—	C
107	—	—	A
108	—	—	B
109	—	—	A
110	—	—	C
111	—	—	A
112	—	—	F
113	—	—	A
114	—	—	B
115	—	—	A
116	—	—	F
117	—	—	A
118	—	—	C
119	—	—	A
120	—	—	E
121	—	—	A
122	—	—	C
123	—	—	A

~~Step Sequence~~	~~Extractor Load~~		
	~~40 lb~~	~~60 lb~~	~~100 lb~~
~~124~~	~~—~~	~~—~~	~~F~~
~~125~~	~~—~~	~~—~~	~~A~~
~~126~~	~~—~~	~~—~~	~~B~~
~~127~~	~~—~~	~~—~~	~~A~~
~~128~~	~~—~~	~~—~~	~~F~~
~~129~~	~~—~~	~~—~~	~~A~~
~~130~~	~~—~~	~~—~~	~~C~~
~~131~~	~~—~~	~~—~~	~~A~~
~~132~~	~~—~~	~~—~~	~~B~~
~~133~~	~~—~~	~~—~~	~~A~~
~~134~~	~~—~~	~~—~~	~~C~~
~~135~~	~~—~~	~~—~~	~~A~~
~~136~~	~~—~~	~~—~~	~~F~~
~~137~~	~~—~~	~~—~~	~~A~~
~~138~~	~~—~~	~~—~~	~~B~~
~~139~~	~~—~~	~~—~~	~~A~~
~~140~~	~~—~~	~~—~~	~~F~~
~~141~~	~~—~~	~~—~~	~~A~~
~~142~~	~~—~~	~~—~~	~~D~~

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 16:03:35 EDT 2024

Committee Statement

Committee Statement: FR-144 updated the test method in Section 12.4 to include all these sections in a reformatted test method. These sections should have been deleted as part of that first revision.

Response Message: SR-54-NFPA 1850-2024

Public Comment No. 29-NFPA 1850-2024 [Sections 12.14, 12.15, 12.16, 12.17, 12.18]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments

0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 67-NFPA 1850-2024 [Section No. A.1.3]

A.1.3

~~Any AHJs incorporating NFPA 1851 or NFPA 1852, or any combination of the two, can replace those references with chapters and still reference similar content. For example, if an AHJ incorporated the 2025 edition of NFPA 1851 (i.e. in accordance with the 2025 edition of NFPA 1851), and they wish to update to the latest information, they can do so by incorporating chapters 1 through 8 and annexes A and D of the 2025 edition of NFPA 1850 (i.e. in accordance with chapters 1 through 8 and annexes A and D of the 2025 edition of NFPA 1850).~~ Beginning with the publication of NFPA 1850 , new editions of NFPA 1851 and NFPA 1852 will not be published as separate, stand-alone standards. Where an authority having jurisdiction wants to update references, the referencing language should refer to NFPA 1850 or the specific chapters of NFPA 1850 , as identified in Section 1.3 .

The numbers found in parentheses at the end of each chapter title refer to the former stand-alone documents and are intended to help users navigate between this standard and the former stand-alone documents.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 23:50:02 EDT 2024

Committee Statement

Committee Statement: The boilerplate text is updated to the most recent version.
Response Message: SR-67-NFPA 1850-2024

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 120-NFPA 1850-2024 [Section No. A.3.3.6]

A.3.3.6 Carcinogen/Carcinogenic.

Lists of carcinogens can be found in the following sources:

(1) US National Toxicology Program (NTP): https://ntp.niehs.nih.gov/pubhealth/roc/index-1.html#toc1

(2) International Agency for Research on Cancer (IARC): ~~http://monographs.iarc.fr/ENG/Classification/~~ https://monographs.iarc.who.int/

(3) National Institute for Occupational Safety and Health (NIOSH): ~~https://www.cdc.gov/niosh/topics/cancer/npotocca.html~~ https://www.cdc.gov/niosh/cancer/about

(4) American Conference of Governmental Industrial Hygienists (ACGIH)~~:~~ , ~~*2016*~~ *Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)*: https://www.acgih.org/science/tlv-bei-guidelines/

Each organization classifies specific substances or activities as being carcinogenic in different ways.

The products of combustion (smoke and fire gases) at a typical residential structural fire are a common source of carcinogens for firefighters. As of 2007, IARC has classified occupational exposure as a firefighter as a Class 2B carcinogen (possibly carcinogenic to humans).

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Sep 06 18:27:22 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The URLs provided in the text are updated.

Response Message: SR-120-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 95-NFPA 1850-2024 [Section No. A.3.3.16]

A.3.3.16 Combination SCBA/SAR.

Combination SCBA/SAR consist of the following:

(1) An SCBA certified as compliant with NFPA 1981, NFPA 1970 (1981), or NFPA 1986

(2) A connection for the attachment of an air line that provides a continuous supply of breathing air that is independent of the SCBA breathing air supply

The definition does not include SAR that are used in conjunction with escape self-contained breathing apparatus (ESCBA) where ESCBA provide less than a minimum rated service life of 30 minutes. For the purposes of this standard, combination SCBA/SAR are encompassed by the terms *self-contained breathing apparatus* and *SCBA*.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 09:32:42 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1981) is added for the consolidated standard.

Response Message: SR-95-NFPA 1850-2024

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
3 Affirmative with Comments
0 Negative with Comments
1 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Abstention

Cinque, Vince
Not on SCBA technical committee

Second Revision No. 96-NFPA 1850-2024 [Section No. A.3.3.24]

A.3.3.24 Disinfectant.

Disinfectants as an antimicrobial agent are considered a pesticide and thus subject to regulations established by the US Environmental Protection Agency (EPA). All disinfectants must be registered with the EPA and meet specific labeling requirements. A listing of currently registered disinfectants can be found at www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants.

Disinfectants are required to be used as specified on the product label as determined by the EPA registration process.

Disinfectants can either be used on hard surfaces such as helmet shells and eye and face protection devices, or be used as a presoak treatment for fabrics and textiles. Appropriately labeled and registered disinfectants can also be used for disinfecting laundry. The specific requirements for demonstrating acceptable performance are found in the following EPA Office of Chemical Safety and Pollution Prevention (OCSPP) product performance test guidelines:

(1) OCSPP 810.2200, “Disinfectants for Use on ~~Hard~~ Environmental Surfaces — Guidance for Efficacy ~~Data Recommendations~~ Testing ”

(2) OCSPP 810.2400, “Disinfectants and Sanitizers for Use on Fabrics and Textiles — Efficacy Data Recommendations”

Both of these documents provide for different classifications of disinfectants for their intended use. Classification types include limited (primarily for household use), general or broad spectrum (used in commercial areas), and hospital or health care. Specific procedures and target microorganisms are utilized to demonstrate the effectiveness of the respective disinfectant. In general, a disinfectant must kill all target microorganisms.

See A.6.4.3 for more information on registered disinfectants.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 09:47:51 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The title of the referenced standard is updated.

Response Message: SR-96-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters

6 Not Returned

23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed

McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 76-NFPA 1850-2024 [Section No. A.3.3.48]

A.3.3.48 Gross Decontamination.

In this standard, the term *preliminary exposure reduction* is used in lieu of the more common industry term *gross decontamination* because it more accurately describes the activities specified by ~~NFPA 1851~~ this standard for initially addressing contaminated firefighting protective ensembles and ensemble elements. It is understood that while preliminary exposure reduction is likely to remove some contamination from the surface of the protective ensemble or ensemble elements, it does not guarantee full cleaning or decontamination for the removal of all contaminants. The use of the term *preliminary exposure reduction* reduces the possible inference that gross decontamination might be the only activity needed to render clothing safe for reuse and free from contamination. In hazardous materials operations, the types of protective clothing might be better designed to resist contamination and allow for easily cleaning given the clothing design and materials. This is not necessarily the case for structural or proximity firefighting protective clothing, particularly after exposure to products of combustion.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Sat Aug 17 02:06:20 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1851 is removed and replaced with "this standard" so that the text doesn't point to the previous edition.

Response Message: SR-76-NFPA 1850-2024

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 22-NFPA 1850-2024 [Section No. A.3.3.91]

A.3.3.91 Restricted Substance.

Restricted substances can be hazardous, toxic, corrosive, ignitable, explosive, chemically reactive, persistent, carcinogenic, mutagenic, teratogenic, or bioaccumulative. These substances are restricted because governments or other organizations have established specific limits for their use in various products that either prohibit their use or set maximum limits for their concentration in the respective product.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Thu Aug 15 11:17:44 EDT 2024

Committee Statement

Committee Statement: The annex information for the definition of restricted substance has been clarified to include some of the more commonly applied characteristics that cause these substances to be restricted.

Response Message: SR-22-NFPA 1850-2024

Public Comment No. 20-NFPA 1850-2024 [Section No. A.3.3.91]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 77-NFPA 1850-2024 [Section No. A.3.3.118]

A.3.3.118 Structural Firefighting Particulate-Blocking Hood.

These protective hoods have been designed to reduce the penetration of particulate contamination from reaching the end user. Hoods are required to meet ~~NFPA 1971 , incorporated in the 2024 edition of ,~~ NFPA 1970 (1971) and requirements for particulate blocking hoods.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Sat Aug 17 02:11:26 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

Response Message: SR-77-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed - important step forward in firefighter safety
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 101-NFPA 1850-2024 [Section No. A.3.3.129]

A.3.3.129 Universal PPE Handling Precautions.

The term *universal precautions* is generally used in healthcare settings where it is defined as an approach to infection control in which human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens. In these circumstances, where differentiation between different body fluids is difficult or impossible, all body fluids should be considered potentially infectious materials. Within the definition, other forms of biological, chemical, or particulate contamination also apply, including contamination by flood water, airborne infectious diseases, fire smoke (including soot and fire gases), and other chemicals. As a minimum, individuals handling contaminated PPE should wear examination or cleaning gloves, a sleeved apron or similar garment, a face shield or goggles, and a respirator if any off-gassing is expected. Owing to their thicker materials, more durable construction, and demonstrated resistance to permeation by different disinfectants, cleaning gloves are recommended over exam gloves if used for actual cleaning or sanitization such as in spot cleaning or other manual cleaning processes for different elements, particularly when performing advanced cleaning using hot water.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Wed Sep 04 13:39:22 EDT 2024

Committee Statement

Committee Statement: Language has been added to distinguish between examination and cleaning gloves.
Response Message: SR-101-NFPA 1850-2024

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert

McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 78-NFPA 1850-2024 [Section No. A.4.2.1]

A.4.2.1

NFPA ~~1500~~ 1550 and NFPA ~~1581~~ 1580 also provide requirements and information on cleaning and decontamination.

Protective ensembles and ensemble elements are important tools that enable firefighters to perform their jobs in a safe and effective manner. Organizations need to recognize that these items do not have an indefinite life span and that regular inspections are a necessary part of any protective equipment program.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Sat Aug 17 02:14:03 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The references to NFPA standards are updated to the consolidated editions.

Response Message: SR-78-NFPA 1850-2024

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 83-NFPA 1850-2024 [Section No. A.4.3.3.2]

A.4.3.3.2

Organizations should consider evaluating the ensemble or ensemble element with tests provided in ~~NFPA 1971 (incorporated in the 2024 edition of~~ NFPA 1970~~)~~ (1971) , in which the accessory could negatively affect the performance of the ensemble or ensemble element, depending on how the element might be affected by the attachment of the accessory *(see Table A.4.3.3.2)*.

Another test that can be used to evaluate the performance of an externally placed accessory is ASTM F1930, *Standard Test Method for Evaluation of Flame Resistant Clothing for Protection Against Fire Simulations Using an Instrumented Manikin*. This test simulates a flash fire exposure using a static manikin. The effects of the flash fire on an ensemble or ensemble element with the accessory can be determined and compared to the effects on an ensemble or ensemble element that does not have the accessory in place. A minimum exposure time of 10 seconds is recommended when evaluating structural or proximity firefighting ensembles. While this test demonstrates ensemble/accessory or ensemble element/accessory performance under emergency conditions, it does not simulate all fireground hazards, and other evaluations should be considered.

Table A.4.3.3.2 Evaluating Possible Negative Effects of Accessory Attachments on Ensembles or Ensemble Elements

Ensemble and Ensemble Element Properties	Applicable Sections of NFPA 1970 (1971)
Garments	
Flame resistance	~~8.2~~ 9.2.1
Heat resistance	~~8.6~~ 9.2.4
Whole-garment liquid integrity	~~8.48~~ 9.5.1
Helmets	
Flame resistance	~~8.3~~ 9.2.2
Heat resistance	~~8.6~~ 9.2.4
Top-impact resistance (force)	~~8.15~~ 9.3.5
Impact resistance (acceleration)	~~8.16~~ 9.3.6
Electrical insulation	~~8.30~~ 9.6.1
Gloves	
Flame resistance	~~8.4~~ 9.2.17
Heat resistance	~~8.6~~ 9.2.4
~~Overall~~ Whole glove liquid integrity	~~8.32~~ 9.5.2
Glove–hand function	~~8.37~~ 9.8.4
Grip	~~8.38~~ 9.8.5
Footwear	
Flame resistance	~~8.5~~ 9.2.3
Heat resistance	~~8.6~~ 9.2.4
Electrical insulation	~~8.31~~ 9.6.2
Slip resistance	~~8.40~~ 9.8.9
~~Overall liquid integrity~~ Liquid penetration resistance	~~8.27.9~~ 9.4.3
Hoods	
Flame resistance	~~8.2~~ 9.2.1
Heat resistance	~~8.6~~ 9.2.4
Liquid and particulate contamination protective ensembles	
Particle inward leakage	~~8.66~~ 9.5.3
Whole ensemble liquid integrity	~~8.48~~ 9.5.1

Supplemental Information

File Name	Description	Approved
1850_SPF_SR83_A.4.3.3.2.docx	staff use	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Sat Aug 17 02:31:27 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with the typical format. The section references in the table are corrected.

Response Message: SR-83-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 84-NFPA 1850-2024 [Section No. A.4.3.4.2]

A.4.3.4.2

Although approval from a manufacturer is not a requirement of this standard, it might be advantageous for the specific element manufacturer to be consulted when there is any question concerning the appropriate cleaning, inspection, or repair of a specific element. ~~NFPA 1971 , incorporated in the 2024 edition of~~ NFPA 1970~~,~~ (1971) requires that every certified element contain the name and address of the element manufacturer so this information is readily available and each manufacturer will be able to offer the best possible practical knowledge of its product.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Tue Sep 03 14:21:27 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

Response Message: SR-84-NFPA 1850-2024

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 15-NFPA 1850-2024 [Section No. A.4.3.4.3.2]

A.4.3.4.3.2

Training should explain the activities that organizations are required to perform in order to comply with this standard, as well as provide information and options in regard to how organizations can accomplish them. This training does not negate the need for organizations to consult with manufacturers on specific instructions for performing inspections or basic repairs on proprietary products, individual ensemble elements, fabrics, or components with unique attributes or performance that require special consideration. For cleaning, it might be necessary to consult a manufacturer who has been verified in cleaning.

~~The following overview can be used as a basis for an NFPA 1850 (1851) structural and proximity firefighting PPE selection, care, and maintenance program.~~

~~The following is included in this overview:~~

- ~~Why this is important~~
- ~~NFPA 1850 consolidation~~
- ~~General guidelines~~
- ~~New this edition~~
- ~~Program basics~~
- ~~Implementing a program~~
- ~~Record keeping~~
- ~~Miscellaneous~~
- ~~Selecting gear~~
- ~~Assessing gear~~
- ~~Receiving gear~~
- ~~Inspecting gear~~
- ~~Cleaning gear~~
- ~~Storing and retiring gear~~

~~*Why this is important.* Structural and proximity firefighting PPE selection, care, and maintenance is important for the following reasons:~~

- ~~Being a firefighter is inherently dangerous. Firefighting gear is designed and manufactured to protect the wearer during structural and proximity firefighting duties.~~
- ~~During firefighting duties, gear becomes contaminated. This contamination can risk exposure to the wearer, other firefighters and emergency response personnel, family members of emergency response personnel, and the public.~~
- ~~Clean gear is critical to supporting health and safety goals.~~

~~*NFPA 1850 consolidation.* The following is a summary of the material covered in the now consolidated NFPA 1850 standard. NFPA 1850 consists of what was NFPA 1851 and NFPA 1852 . This overview focuses on what was NFPA 1851–specific material.~~

- ~~Chapters 1 – 3 contain material common to both standards.~~
- ~~Chapter 4 – 12 and Annexes A and E contain NFPA 1851 –specific material.~~
- ~~Chapters 13 – 16 and Annexes A– E contain NFPA 1852–specific material.~~

~~General guidelines. The following is a summary of the material covered in the NFPA 1851–specific chapters of NFPA 1850:~~

- ~~Chapter 1 provides information about the scope and purpose of the document, and some basics about how to apply the standard.~~
- ~~Chapter 2 lists other publications referenced in the document.~~
- ~~Chapter 3 contains the glossary of terms used in the document.~~

Chapter 4 provides the framework for designing and implementing a structural and proximity firefighting PPE selection, care, and maintenance program.

Chapter 5 focuses on selecting PPE.

Chapter 6 lays out the requirements for completing a routine inspection, an advanced inspection, and a complete liner inspection.

Chapter 7 is all about cleaning and disinfection.

New this edition. The following topics are new to the 2025 edition of NFPA 1850:

Definition, role, and responsibilities of a PPE technician

More information on advanced cleaning

Updated cleaning efficiency requirements

Example risk assessment documents

Program basics. The following is the basic framework for designing and implementing a structural and proximity firefighting PPE selection, care, and maintenance program:

PPE is designed and manufactured to meet high performance and protection standards and it needs to be treated and handled appropriately to help ensure it can protect the person wearing it.

A successful program provides a strong foundation for informing everyone in the department how PPE should be handled and maintained.

The requirements in Chapters 4 – 12 are minimum requirements for the selection, care, and maintenance of structural and proximity firefighting protective clothing and equipment that are compliant with NFPA 1970 (1971) only.

A structural and proximity firefighting PPE selection, care, and maintenance program should contain documentation for clear expectations and procedures for all of the following to ensure equipment functions as designed and harm from improper selection, care, and maintenance is minimized:

- Records of all PPE
- Protection from contaminated PPE
- Selection of PPE
- Inspection of PPE
- Cleaning of PPE
- Repair of PPE
- Storage of PPE
- Retirement, disposition, and special incident procedures for all PPE

Specific operations included in NFPA 1850 that should be incorporated into a structural and proximity firefighting PPE selection, care, and maintenance program include the following:

- Routine inspections
- Preliminary exposure reduction (PER)
- Advanced inspection
- Complete liner inspection
- Advanced cleaning
- Sanitization or disinfection
- Specialized cleaning

- Basic repair
- Advanced repair
- Training for inspection
- Training for cleaning
- Training for repairs

Implementing a program. A department can implement a structural and proximity firefighting PPE selection, care, and maintenance program through one, or a combination of, the following providers defined in Chapter 3 (There is also a reference table in Chapter 4 .):

- Manufacturer verified in cleaning
- Verified ISP or verified organization
- Verified cleaner
- Manufacturer-trained organization
- User
- Ensemble manufacturer or ensemble element manufacturer (protective clothing and equipment manufacturer)

Each provider with "verified" in its title must pass third-party verification and have a certificate. That certificate lists the specifics for which that service provider is verified. Check Intertek and UL for websites to find verified ISPs to service gear.

Record keeping. Record keeping includes, at a minimum, the following:

- The person to whom a PPE element has been issued
- PPE elements that are not issued to a specific person
- The date of issue and condition of the PPE when issued
- The manufacturer and model name or design of the PPE
- The PPE manufacturer's identification number, lot number, or serial number
- The month and year of manufacture for the PPE
- All dates of and findings related to advanced inspection(s)
- All dates of and findings related to advanced cleaning, disinfection or sanitization, or specialized cleaning
- All dates of repair(s), who performed the repair, and a brief description of the repair for all PPE
- The date of retirement for the PPE
- The date and method of disposal for the PPE

Records can be collected and stored either as hard copies or electronically, or both. Records should be maintained until a PPE element is retired and disposed of. If resources permit, records should be kept for at least 12 months past retirement.

Miscellaneous. All manufacturer's instructions should be kept. If a manufacturer's instructions differ from the requirements in the standard (except as related to verification), the manufacturer's instructions should supersede all other instructions.

Chapter 4 is important because it provides clear direction for defining a structural and proximity firefighting PPE selection, care, and maintenance program, as well as additional information for the rest of Chapters 5 through 12 .

Selecting gear. Where a department is set to select gear, all of the following should be considered:

- A risk assessment should be performed (tis standard includes multiple examples).

The types of incidents the department responds to.

The gear that can provide the most appropriate protection.

A risk assessment should include, but not be limited to, all of the following:

Type of duties performed

Incident types with related response activities identified

What the organization has experienced in the past

Incident operations

Local geographic and climate considerations

The specific physical area of operation

The likelihood of, or response to, a CBRN terrorism incident

The risks associated with not having access to two sets of gear

After the risk assessment is complete, take time to evaluate the strengths and weakness of all PPE elements under consideration, such as thermal insulation, thermal comfort, interface areas, and so on.

Assessing gear. The following guidelines should be used where evaluating gear in the filed:

Make sure that all gear to be tested fits the were as designed by the manufacturer.

Have a systematic (i.e., quantifiable) way to evaluate the performance of each PPE element tested, as follows:

Use a combination of quantitative and qualitative mechanism for gathering feedback

Use the same firefighters to evaluating different PPE elements, if possible

If a department can't run a field evaluation alone, team up with other local departments to run a joint field evaluation

Prior to any gear purchase, all purchase specifications should be detailed and include at least the following:

Be certified to NFPA 1970

Require substantiation of certification as part of the specification

Define proper fit in the specification

Comparison of each bid submittal against the specification

Include procedures for returning gear that isn't satisfactory or doesn't meet the specification

Receiving gear. Upon delivery, all gear should be inspected to confirm the following:

Does the gear meet the specification?

Was any gear damaged in shipment?

Are all sizes and quantities ordered accounted for?

Is all information such as use and maintenance instructions, warranty, and technical data included?

Any gear that is unsatisfactory or does not meet the specification should be returned per established procedures.

Inspecting gear. All PPE elements should be inspected for the following both prior to donning and after an incident:

Rips, tears, or holes

~~Charring, burns, melting, or discoloration~~

~~Chemical damage~~

~~Missing or damaged reflective trim~~

~~Correct assembly of shell, liner, and DRD~~

~~Missing hardware~~

~~Any damaged or incomplete gear should be removed from service. Back-up gear should be utilized until damaged or incomplete gear is repaired by the original equipment manufacturer (OEM), a verified independent service provider (ISP), or verified department personnel to NFPA 1850 requirements or is replaced.~~

~~*Cleaning gear.* All gear should be cleaned as determined by Figure A.4.3.4.3.2(a) for exposure and Figure A.4.3.4.3.2(b) for contamination.~~

~~Figure A.4.3.4.3.2(a) Basic Exposure Decision Tree.~~

~~Figure A.4.3.4.3.2(b) Contamination Decision Tree.~~

~~*Cleaning gear.* Where gear needs to be cleaned, there are three levels of cleaning as follows:~~

~~Routine wash~~

~~Advanced (machine washing)~~

~~Specialzed (pretreat/soaking)~~

~~A routine wash can reduce preliminary exposure contaminants. However, advanced cleaning is most often necessary. The following precautions should be taken where advanced cleaning is needed:~~

~~Never use bleach~~

~~Water temperature should not exceed 40°C (105°F).~~

~~Extraction g-forces should not exceed 100.~~

~~Cleaning agent Ph should be between 6.0 and 10.5.~~

~~Liners should be washed separately, inside out.~~

~~Advanced cleaning should only be done twice per 12-month period.~~

~~Where advanced cleaning is needed, all of the following procedures should be implemented:~~

~~Separate outer shells from liners~~

~~Invert liners so quilt is facing the outside~~

~~Secure all closures (e.g., velcro, hook and dees, zippers)~~

~~DRD does not have to be removed if closures are secure~~

~~Machine wash outer shells with outer shells~~

~~Machie wash inner liners with inner liners~~

~~Hoods can be washed with liners~~

~~Air dry all elements~~

~~*Storing and retiring gear.* Where storing gear, care should be taken to protect all PPE elements from UV lighting. Gear should be transported in a plastic or gear bag. Gear should not be stored in air-tight bags.~~

~~PPE elements should be retired per the following considerations:~~

~~Structural fire firefighting and proximity ensemble elements should be retired and removed from service no more than 10 years from the date of manufacture.~~

~~Structural fire firefighting and proximity firefighting ensembles should be retired when they are worn or damaged to the extent that they can no longer be repaired.~~

~~Recommendations for retirement can be made by an ISP; however, final determination should be made by a member of the organization who has been trained in the inspection and repair of ensembles.~~

~~Retired structural fire firefighting and proximity elements that have been retired should be destroyed in such a manner that prevents their use in firefighting or other emergencies.~~

~~Retired elements that are retired but still serviceable can be used for training provided the training does not involve live firefighting.~~

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Aug 14 18:10:54 EDT 2024

Committee Statement

Committee Statement: The training outline provided in new Annex E replaces the deleted text.

Response Message: SR-15-NFPA 1850-2024

Public Comment No. 83-NFPA 1850-2024 [Section No. A.4.3.4.3.2]

Public Comment No. 21-NFPA 1850-2024 [Section No. A.4.3.4.3.2]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters

6 Not Returned

23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed

McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 79-NFPA 1850-2024 [Section No. A.5.1.1]

A.5.1.1

In general, some hazards that can be encountered include, but are not limited to, physical, environmental, thermal, chemical, biological, electrical, radiation, operational, and ergonomic hazards. The organization should also consider the frequency and severity of the identified hazards when conducting the risk assessment.

The safety officer is the logical individual to perform this function since that is his or her role in the organization. The safety officer should consider national trends when performing this task. NFPA ~~1500~~ 1550 substantiates OSHA's regulations as follows:

(1) Section ~~4.3~~ 6.4 : Mandatory evaluation of safety and health programs

(2) Subsection ~~4.4.2~~ 6.5.2 : Mandatory compliance with state and federal laws

(3) Section ~~4.7~~ 6.8 : Safety officer's responsibilities, also defined in ~~NFPA 1521~~ Chapter 4

(4) Section ~~7.1~~ 9.1 : Requirements for ensembles and ensemble elements

In the identification of hazards, the organization should consider those hazards that firefighters are likely to encounter. A list of hazards is provided in Table A.5.1.1. In determining risk, the organization should consider the frequency or likelihood of exposure to the hazard along with its potential severity (consequence) if exposure occurs.

Table A.5.1.1 List of Potential Fire Ground and Other Related Emergency Hazards

Physical Hazards	***Chemical Hazards***
Falling objects	Inhalation
Flying debris	Skin absorption or contact
Projectiles or ballistic objects	Chemical ingestion or injection
Abrasive or rough surfaces	Liquefied gas contact
Sharp edges	Chemical flashover
Pointed objects	Chemical explosions
Slippery surfaces	***Electrical Hazards***
Excessive vibration	High voltage
Environmental Hazards	Electrical arc flashover
High heat and humidity	Static charge buildup
Ambient cold	***Radiation Hazards***
Wetness	Ionizing radiation
High wind	Nonionizing radiation
Insufficient or bright light	***Person–Position Hazards***
Excessive noise	Daytime visibility
Thermal Hazards	Nighttime visibility
High convective heat	Falling
Low radiant heat	Drowning
High radiant heat	***Person–Equipment Hazards***
Flame impingement	Material biocompatibility
Steam	Ease of contamination
Hot liquids	Thermal comfort
Molten metals	Range of motion
Hot solids	Hand function
Hot surfaces	Ankle and back support
Biological Hazards	Vision clarity
Bloodborne pathogens	Communications ease
Airborne pathogens	Fit (poor)
Biological toxins	Ease of donning and doffing

Physical Hazards	Chemical Hazards
Biological allergens	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Sat Aug 17 02:16:21 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1500 is updated to the consolidated NFPA 1550.

Response Message: SR-79-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 100-NFPA 1850-2024 [Section No. A.5.1.2(8)]

A.5.1.2(8)

~~While~~ A second or spare set of gear reduces a firefighter's extended exposure to products of combustion/contamination. And, while every department does not have the resources to purchase and manage a second set of PPE for every firefighter, there are other ways to accomplish the same goal. ~~A second or spare set of gear reduces a firefighter's extended exposure to products of combustion/contamination.~~ Your risk assessment should help you quantify your specific needs related to spare gear, and you can use that information to identify solutions that might work better for your department and community than providing a second set of gear for each member.

~~For instance, identifying resources for rental gear during a risk assessment gives the department a better chance of being able to respond quickly when an incident happens that requires more gear than the department regularly has access to~~ One way to access spare gear if your department doesn't have a regular need for it is to establish a relationship with a verified ISP or manufacturer with a rental gear program, so that, in the event your department is faced with a once-in-a-career emergency (e.g., the train derailment in East Palestine, Ohio)~~.~~ , your organization has a documented, established source for accessing the gear you need without purchasing, storing, and maintaining a second set of gear for each member .

Another way to accomplish this is to identify the most common sizes of gear in your department and ~~purchasing~~ purchase a sufficient number of sets or elements to cover the most people for a given risk.

Identifying resource requirements for incident response related to PPE during a risk assessment gives the department a better chance of being able to respond quickly when an incident happens that requires more gear than the department regularly has access to.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Wed Sep 04 12:59:30 EDT 2024

Committee Statement

Committee Statement: The annex material is revised to provide more detail for the department to apply to their risk assessment related to spare gear and alternative resources for supplying or obtaining gear.

Response Message: SR-100-NFPA 1850-2024

Public Comment No. 81-NFPA 1850-2024 [Section No. A.5.1.2(8)]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments

0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 85-NFPA 1850-2024 [Section No. A.5.1.4]

A.5.1.4

Certification of protective elements can be checked by examination of the product label for the mark of the certification organization. The organization should further check the certification of the specific protective element by contacting the certification organization and asking if the item is listed as being certified as compliant with ~~NFPA 1971 , incorporated in the 2024 edition of~~ NFPA 1970 (1971) . Finally, the organization can check the legitimacy of the certification organization by asking for documentation that shows that the certification organization has been accredited to ISO/IEC 17065, *Conformity assessment — Requirements for bodies certifying products, processes, and services*.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Tue Sep 03 14:22:58 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

Response Message: SR-85-NFPA 1850-2024

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 86-NFPA 1850-2024 [Section No. A.5.1.5]

A.5.1.5

The majority of tests in ~~NFPA 1971 , incorporated in the 2024 edition of~~ NFPA 1970 (1971) , provide quantitative results; however, some tests are established on the basis of pass or fail results and cannot be readily compared. Specific tests that offer comparative performance results include, but are not limited to, the following:

(1) Protective garment elements, including the following:

- (a) Thermal protective performance of the material composite
- (b) Total heat loss of the material composite
- (c) Conductive and compressive heat resistance of reinforcements
- (d) Thermal shrinkage of the material layers (outer shell, moisture barrier, thermal barrier)
- (e) Flame resistance of material layers and other components (outer shell, moisture barrier, thermal barrier, other material layers and components)
- (f) Tear resistance of the material layers (outer shell, moisture barrier, thermal barrier)
- (g) Cleaning shrinkage of the material layers (outer shell, moisture barrier, thermal barrier)
- (h) Water absorption resistance of the outer shell
- (i) Tensile strength of the outer shell
- (j) Seam strength of outer shell, moisture barrier, and thermal barrier layers
- (k) Visibility properties of the trim
- (l) Radiant reflectance of the outer shell (for proximity firefighting protective clothing)

(2) Protective helmet elements, including the following:

- (a) Impact resistance (top and acceleration) after selected preconditions
- (b) Flame resistance
- (c) Heat resistance (level of sagging)

(3) Protective glove elements, including the following:

- (a) Thermal protective performance of glove body and, if present, wristlet
- (b) Conductive heat resistance of glove body
- (c) Thermal shrinkage of glove and innermost material
- (d) Cut resistance of glove body
- (e) Puncture resistance of glove body
- (f) Burst strength of wristlet material
- (g) Dexterity of whole gloves
- (h) Grip of whole gloves

(4) Protective footwear elements, including the following:

- (a) Flame resistance
- (b) Radiant heat resistance of upper
- (c) Conductive heat resistance of sole and upper
- (d) Puncture resistance of sole and upper
- (e) Cut resistance of upper
- (f) Abrasion resistance of sole

(5) Protective hood interface elements, including the following:

(a) Thermal protective performance of hood material

(b) Flame resistance of hood material

(c) Thermal shrinkage of hood material

(d) Burst strength of hood material

(e) Cleaning shrinkage of hood material

(f) Particulate contamination blocking layer

Additional testing can also be specified for performance properties not addressed in ~~NFPA 1971 , incorporated in the 2024 edition of~~ NFPA 1970 (1971) , based on the organization's hazard and risk assessment. When additional testing is specified, standard test methods should be used when available, and testing should be conducted at accredited, independent laboratories.

Organizations should consider the use of a request for information (RFI) or a request for proposal (RFP) format when soliciting quotations for structural or proximity firefighting protective ensemble elements. The advantage of an RFI or an RFP proposal is that it allows manufacturers the option of providing all of the most current technologies for organization review (the offering is then not limited to the requirements of the specification). The organization can then choose among proposals for offered items finally accepted. Typically, an RFI and an RFP have the following characteristics:

(1) Minimum requirements, such as NFPA product certification, required materials, or available options

(2) Inclusion of current specifications and a requirement that each manufacturer explain how its offering differs from the currently specified product

(3) Background on the offering firm's finances, capabilities, and references

(4) Field test procedures and results *(see 5.1.6)* of offered products

Using this approach, the organization can then employ a rating system that assigns values and weights to several factors, including, but not limited to, product design, manufacturer references, and field test results.

In this approach, a separately sealed cost proposal is opened only after the point ratings have been assigned to each offering. The organization can then apply separate criteria considering both technical merits and cost. This approach allows fire departments to compare prices and product acceptability.

Organizations should also consider integrated PPE programs that address various levels of care and maintenance as provided by or coordinated by the manufacturer of the firefighter personal protective equipment. These programs can address many of the aspects of care and maintenance that are addressed in this standard, including, but not limited to, cleaning, inspection, and repairs, in addition to the offer of program guidance and reporting and documentation of procedures.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Tue Sep 03 14:23:51 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

Response Message: SR-86-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 59-NFPA 1850-2024 [Section No. A.5.1.5.1]

A.5.1.5.1

Tradeoffs exist between the levels of thermal insulation provided by garment composite materials and the ability of those materials to trap heat that potentially leads to heat stress of the firefighter. In ~~NFPA 1971 , incorporated in the 2024 edition of~~ NFPA 1970 (1971) , thermal protective performance (TPP) testing measures the amount of heat transfer through the clothing composite (i.e., the combination of the primary garment clothing layers — the outer shell, the moisture barrier, and the thermal barrier) when exposed to a combination of convective heat and thermal radiation. The exposure level is intended to simulate the heat energy associated with a flashover. The test uses a calorimeter to measure the time-to-burn. The reported TPP rating is this time-to-burn multiplied by the exposure energy (2.0 $cal/cm^2/sec$). It is important to recognize that TPP testing simulates only one condition among an unlimited set of clothing exposure conditions. However, the TPP test is the primary measurement for qualifying garment composite material for thermal insulation. The minimum TPP value specified by NFPA 1970 (1971) for garment composites is 35.0 $cal/cm^2/sec$. Higher values of TPP indicate composites offering greater thermal insulation.

A total heat loss (THL) test is used to measure how well garments allow body heat to escape. The test assesses the loss of heat, both by the evaporation of sweat and the conduction of heat through the garment layers. As clothing is made more insulative to high heat exposures, there is a tradeoff with how well the heat build-up in the firefighter's body (that can lead to heat stress) is alleviated. Differences in the weight and other characteristics of garment material composites, including the type of moisture barrier, will affect the transmission of sweat moisture, which carries much of the heat away from the body. If this heat is kept inside the ensemble, the firefighter's core temperature can rise to dangerous levels if other efforts are not undertaken (i.e., limiting time on scene, rotating firefighters, and providing rehabilitation at the scene). NFPA 1970 (1971) specifies that garment composites have a minimum THL of 205 W/m^2. Higher THL values indicate composites that provide greater heat loss. The validation and origin of this requirement is discussed in ASTM ~~STP1386~~ STP14465S , *Field Evaluation of Protective Clothing Effects on Fire Fighter Physiology: Predictive Capability of Total Heat Loss Test*.

There are also limitations in the application of THL testing. Just as TPP testing only evaluates the base three-layer fabric system for thermal insulation, THL testing is a material test and does not evaluate the entire capability of the garment to dissipate heat. Areas of garments with additional layers such as trim, pockets, and reinforcements have less breathability. In contrast, these same areas of the garment have greater thermal insulation. The specifications of garment design must account for which areas of the garment need reinforcement and other materials and how these additional materials and reinforcements could contribute to stress.

Organizations should be aware that small differences in TPP and THL values might not represent significant differences that will translate into differences in field performance of garments. There is variation in the test results for both TPP and THL where values of ±3 cal/cm^2 in TPP and values of ±20 W/m^2 in THL might be due to variation in results produced by the materials rather than true differences in the garment composite materials.

In general, as garment material composite thickness increases, higher levels of thermal insulation (measured using TPP testing) are obtained. At the same time, thicker composites typically create more stress on the firefighter. By also examining the results of THL testing, organizations can choose to optimize the selection of their composites by balancing composite THL values with TPP values, while still meeting the minimum performance for both areas of performance. For TPP testing, thermal barriers usually have the greatest impact, but like THL, the TPP value for a composite is based on the contribution from each layer.

Other measurements can be introduced to characterize garment material composite thermal insulation or heat stress effects. For example, the evaporative resistance test (referred to as Ret), which is also performed on the three base layers, offers a means for measuring the ability of the garment composite to allow the heat associated with sweat evaporation to pass through the material. Like THL, this test is associated with demonstrating the breathability of the garment material composite. In this test, different environmental conditions provide a different way of ranking composite performance~~; . although there are no established performance requirements for Ret within NFPA 1970 .~~ Specific research conducted by ~~North Carolina State University using a physiological manikin and reported by the Fire Industry Education Resource Organization (F.I.E.R.O.)~~ [Gao, Huipu, et al., "Relationship between heat loss indexes and physiological indicators of turnout-related heat strain in mild and hot

environments"] ~~have~~ has shown that Ret provides discrimination of the composite materials' impact on wearer core temperature, skin temperature, and sweating rate with a higher correlation than THL over three different environmental conditions — hot, mild, and warm. This information means that Ret might provide a more reliable prediction and discrimination of the stress effects of different material composites on the protective clothing wearer as compared to THL. Unlike THL, the reported Ret measurement is a resistance having units of Pa m^2/W where lower values are associated with more breathable material composites.

Organizations should be aware that the measurements of garment material composite thermal insulation and heat stress effects are performed on the principal three-layer composite used in the construction of the garment and do not account for other layers that might be on the garment such as trim, pockets, outer shell reinforcements, and liner reinforcements. While necessary to meet the requirements of the standard and assist firefighters in performing their duties, these additional layers increase overall thermal insulation and decrease breathability, resulting in potentially higher heat stress effects. Consequently, when deciding on the target levels of composite thermal insulation and breathability (i.e., total heat loss or evaporative resistance), organizations should take into account the garment design and how both thermal insulation and heat stress effects will be affected by both mandatory (e.g., trim, shoulder reinforcements, knee reinforcements) and optional (e.g., pockets) garment design features. Results for the investigation of these effects by McQuerry, et al., is provided in "The Cost of a Pocket: The Impact of Reinforcements on the TPP and THL."

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Aug 16 16:25:49 EDT 2024

Committee Statement

Committee Statement: A specific reference to the scientific literature on Ret was added. Also, the text was updated to reflect the inclusion of performance criteria in NFPA 1970.

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

The reference to ASTM STP1386, which is a collection of papers presented at a symposium that contains the paper, to ASTM STP14465S, which is the specific paper.

The author(s) of the paper is added in the last paragraph to help readers locate the citation in the list of references.

Response Message: SR-59-NFPA 1850-2024

Public Comment No. 22-NFPA 1850-2024 [Section No. A.5.1.5.1]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
3 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Stull, Jeffrey O.

Agree

Negative with Comment

Reidy, Jim

I don't remember us promoting/voting for RET in the standard as more reliable

Second Revision No. 87-NFPA 1850-2024 [Section No. A.5.1.8]

A.5.1.8

Specifications translate the organization's needs into performance or design requirements that can be met by manufacturers of protective equipment. Specifications should clearly address every aspect of the department's needs and expectations in regard to both the performance and the delivery of the ensembles or ensemble elements.

Organizations should specify delivery time requirements and, if appropriate, penalty assessments for not meeting delivery dates. Warehousing requirements, if desired, should also be established in the procurement specification.

Organizations should be careful not to write specifications that are redundant or contradictory or that cannot be met by manufacturers of ensembles or ensemble elements. For example, the organization should be sure the thermal protection performance (TPP) specified can be achieved with the materials specified. A prebid meeting with participation by potential bidders or manufacturers is useful in eliminating inconsistencies and explaining requirements that might be unclear in the specifications.

Organizations should continuously review and document how their specifications and ensembles and ensemble elements meet their needs and applicable standards. There are many ways to improve the quantity and quality of information received from prospective bidders. Additionally, increased purchasing power potential can be gained by forming collective buys with other organizations for possible volume discounts.

Purchase specifications should indicate the organization's selection of choice for the following required ~~NFPA 1971 (incorporated in the 2024 edition of~~ NFPA 1970~~)~~ (1971) ensemble element components:

(1) Garments, as follows:
    (a) Outer shell material: fabric, weight, color
    (b) Thermal liner material
    (c) Moisture barrier material: base fabric, film, or coating
    (d) Trim: configuration, material, color
    (e) Closure system
    (f) Wristlets: material, design

(2) Hoods, as follows:
    (a) Material
    (b) Face opening design
    (c) Particulate contamination blocking layer

(3) Gloves, as follows:
    (a) Composite materials
    (b) Wristlet or gauntlet
    (c) Wristlet material

(4) Helmets, as follows:
    (a) Material
    (b) Color
    (c) Retention system
    (d) Trim configuration
    (e) Trim color
    (f) Ear cover material
    (g) Ear cover dimension
    (h) Eye protection

(5) Boots: composite materials

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Tue Sep 03 14:27:13 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

Response Message: SR-87-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 80-NFPA 1850-2024 [Section No. A.6.3.2.1]

A.7.3.2.1

For any inspection program to be effective, ensembles and ensemble elements should be evaluated by trained individuals. The individuals evaluating the ensembles and ensemble elements should understand the limitations of each element and recognize the signs of failure. Utilizing trained individuals provides consistency on whether an item should be repaired or retired. The manufacturer and the organization, the verified ISP and the organization, or a verified organization should determine the level of training required to perform advanced inspections. Resources for training that should be considered, as a minimum, are the manufacturer(s) of the elements in use; the Fire and Emergency Manufacturers and Services Association (FEMSA) user guides; NFPA ~~1500~~ 1550 ; and professional cleaning and repair facilities.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Sat Aug 17 02:21:51 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1500 is updated to the consolidated NFPA 1550.

Response Message: SR-80-NFPA 1850-2024

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 99-NFPA 1850-2024 [Section No. A.6.3.5.4.1]

A.7.3.5.4.1

Water integrity of gloves can be evaluated by inserting brown paper towels into the palm area, immersing the glove into a column of water in an upright position for two minutes, removing the paper towels, and evaluating for evidence of water leakage.

For example, a glove dunk test can be conducted as follows:

(1) Place a brown paper towel in the glove in the palm and finger area.

(2) Immerse the glove into a column of water to leave 1 in. of the cuff of the glove out of the water to eliminate the possibility of wicking.

(3) The glove should stay immersed in the water column for 5 minutes.

(4) The glove should be removed and the paper removed to evaluate for any water penetration into the element.

(5) If any moisture is found on the paper towel, the glove should be removed from service.

(6) The glove should be allowed to completely dry prior to returning to service.

Alternatively, the procedure described in A.7.3.5.4(3) can be followed. Consultation with the manufacturer is also advised.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 12:49:13 EDT 2024

Committee Statement

Committee Statement: The method described in A.6.3.5.4(3) might be easier to perform. Also, manufacturers should be consulted to determine the recommended method for testing their product due to the wide variety of materials and designs.

Response Message: SR-99-NFPA 1850-2024 - The committee did not see that it was necessary to specify the size of the paper towel to be used in the glove/footwear as this is intended to be a simple evaluation.

Public Comment No. 84-NFPA 1850-2024 [Global Input]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 97-NFPA 1850-2024 [Section No. A.7.3.7.2]

A.6.3.7.2

The pH for the product can be indicated on the product (i.e.,detergent) container and should be the pH for the product in an undiluted form if it is a liquid. If the detergent is a powder, the pH will be reported at a specific concentration of the solid on a weight basis in water. If the pH is not listed on the product container, then the safety data sheet (SDS) should be requested from the product supplier. Most suppliers will normally provide the SDS for their respective products as part of the shipment, and it might also be possible to obtain a copy of the SDS online from the supplier's website.

The pH for the product is typically listed in Section 9 of the SDS for the product's physical and chemical properties.

The selection of the detergent should include a consideration of several factors in addition to the pH range. Foremost among these is demonstration by the supplier that the detergent is safe to use with firefighter protective clothing. This demonstration consists of the following two parts:

(1) The effectiveness of the detergent in removing soils and other contaminants as indicated later in this section *(see Section ~~11.8~~ 12.2 for separately verified detergents or cleaning/decontamination products)*

(2) The impact of the detergent through multiple washings on the protective element as specified in Section 11.5

This information might be available from the supplier of the detergent, the manufacturer of the protective element, or the fabric suppliers. If there is uncertainty about a particular detergent or cleaning agent, the manufacturer of the protective element should be contacted.

Organizations should be cautious about detergent or chemical suppliers that offer several different chemicals for cleaning protective elements. Many chemical suppliers will provide the organization with an automated dispenser that can feed liquid chemicals into the washer/extractor at no cost, on the requirement that chemicals are purchased from that supplier. Certain types of chemicals, such as alkali builders and sours, should be avoided. Alkali builders are used to significantly increase the pH of the wash water for enhancing the cleaning performance of certain detergents. These chemicals typically have pH values that are greater than 9.5. When alkali builders are used, the pH is usually brought to a lower level using a "sour," an acid-based agent used to bring the wash water back to a neutral pH. Sour cleaning agents are added toward the end of the wash formulation and almost always have pH values much lower than 6.0. The combination of alkali builders and sours is most often used in institutional laundering facilities but is not appropriate for protective elements unless the manufacturer of the respective protective element has indicated that these types of products can be used safely.

In general, mild domestic laundry detergents can be used if applied with the instructions provided for the laundry in terms of the amount of detergent added for the wash water volume used in the suds (detergent addition step) for the specific washing machine or washer/extractor. A single detergent can be viable for washing both the shell and liners for structural firefighting protective garments; however, some suppliers might offer specialty detergents that have been formulated for either heavier duty cleaning of outer shells or gentler cleaning of linings. In addition, spot treatment agents are usually required for removal of specific heavy soiling and some common fireground contaminants.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 11:47:58 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

Section 11.8 was moved to a new Chapter 12. [See SR-65.]

Response Message: SR-97-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 88-NFPA 1850-2024 [Section No. A.7.3.7.3]

A.6.3.7.3

Cleaning processing can have different effects on the performance properties of protective ensembles or ensemble elements, especially when repeated multiple times over the life cycle of the ensemble or ensemble element. The effects of the cleaning agent or cleaning process should be judged on the basis of tests performed on representative material samples following several cleaning cycles (washing and drying). The samples should be subjected to at least 30 cleaning cycles; however, ISPs, verified cleaners, or organizations might want to demonstrate effects for a greater number of cycles.

Ideally, ensembles and ensemble elements should be evaluated for each of the performance properties listed in ~~NFPA 1971, incorporated in the 2024 edition of~~ NFPA 1970 (1971) ; however, key properties can be selected and evaluated before and after cleaning to determine the multiple applications of cleaning on garment material or component. Section 11.5 provides criteria for evaluating the impact of multiple cleanings on key performance properties.

Other properties that are of interest to the organization can be evaluated, including, but not limited to, the following:

(1) Composite weight

(2) Composite thickness

(3) Composite total heat loss (breathability)

(4) Outer shell colorfastness to washing

(5) Outer shell colorfastness to light exposure

(6) Outer shell or thermal barrier abrasion resistance

The effects of cleaning properties are evaluated by comparing the measured property after washing with the same property measured for new material. It is important to review both the after-cleaning level and the change for the measured property. Properties should remain at or above the minimum performance requirements established in ~~NFPA 1971 (incorporated in the 2024 edition of~~ NFPA 1970 (1971). However, it should be recognized that some properties, such as composite total heat loss and individual layer tear resistance might be reduced and fall below initial ~~NFPA 1971 (incorporated in the 2024 edition of~~ NFPA 1970 (1971) minimum performance requirements during the service life of the garment. These criteria only pertain to ensembles and ensemble elements when new; therefore, experienced individuals within the organization should make a determination on whether diminished performance represents a safety hazard to the wearer.

It is also important to take note of large changes in clothing material properties, even if the results show compliant performance. For example, the tear strength of a material can be measured at a level of 11.4 kg (25 lb) before cleaning and then 10 kg (22 lb) after several cycles, whereas a different material could begin at 18.2 kg (40 lb) and drop to 11.4 kg (25 lb) after the same number of cleaning cycles. This particular case points out that one material might be more susceptible to damage during cleaning.

It is also possible for some measured properties to increase after multiple cleaning cycles. For example, thermal insulation as measured in the thermal protective performance test often improves after cleaning because the thickness (or loft) of the materials increases. Conversely, the total heat loss (THL) value of the same ensemble can decrease as a result of cleaning.

In evaluating the effects of cleaning agents or cleaning procedures on ensembles and ensemble elements, it is important to realize that applying multiple cleaning cycles does not simulate its use. Cleaning is but one factor in the wear of protective ensemble and ensemble elements. Cleaning, when properly applied, might also extend the life of the ensemble and ensemble element.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Tue Sep 03 14:29:09 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

Response Message: SR-88-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann

Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 98-NFPA 1850-2024 [Section No. A.7.3.7.4]

A.6.3.7.4

Organizations should be aware that cleaning of protective equipment is a complicated process and that there is no guarantee that the protective elements will be free from contamination after being subjected to an appropriate advanced or specialized cleaning procedure.

Testing for Cleaning Effectiveness. While the purpose of cleaning is to remove all contamination from an ensemble or ensemble element, cleaning processes are not always 100 percent effective in removing all contamination. The actual success of a cleaning process can be determined only by measuring the concentration of the contaminant(s) in the element before and after the selected process. The majority of tests that can be applied for measuring the concentration of contamination in the ensemble or ensemble element require destructive sampling of the ensemble or ensemble element that could render it unusable or nonrepairable. Furthermore, many test methods require only small portions of material for analysis; therefore, there is a lack of certainty that the swatches or pieces of material analyzed are representative of the entire ensemble or ensemble element. In addition, if destructive testing of one or more ensembles or ensemble elements is applied, then assumptions about other untested ensembles or ensemble elements have to be made, which might not be verifiable.

If testing is performed on a contaminated ensemble or ensemble element, it is also necessary to test unaffected elements in order to get a baseline on chemicals that might already be present in the clothing so that an adequate comparison of cleaned and uncleaned clothing can be made to determine the effectiveness of the cleaning process. When noncontaminated elements are selected for testing, they should be selected in such a fashion as to provide a similar age and level of use and prior cleaning for establishing an appropriate baseline. While an analysis of the rinse water or other extract from a cleaning process can provide some information, the sole evaluation of contamination levels in rinse water is not an appropriate measure of effectiveness. Claims for ensembles or ensemble elements being contaminant-free based on statements from any organization or facility or based on the use of specific cleaning products or processes should be viewed with caution unless detailed information demonstrating effectiveness in removing specific contaminants from relevant firefighter ensembles or ensemble elements is provided.

General Procedures for Clothing Contamination Testing. Procedures used for measuring contamination levels should be specific for the contaminant(s), if known. Useful analytical procedures for measuring levels of a broad range of semivolatile organic chemicals in materials are found in the following sections provided in EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*: Method 3540C, “Soxhlet Extraction” and Method 8270~~D~~ E , “Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC~~/~~ - MS).”

These procedures involve extracting a small piece of fabric in a solvent such as methylene chloride and analyzing the extract solution using gas chromatography in conjunction with mass spectrometry. The gas chromatography separates chemical contaminants and quantifies their amount, while the mass spectrometry identifies the separate chemicals. It is important to note that these procedures only target certain classes of common chemical contaminants such as polynuclear aromatic hydrocarbons, phthalates, certain substituted phenols, and other low volatility organic compounds. Different extraction and analysis methods have to be used for other contamination substances such as brominated fire retardant chemicals and substituted dioxins.

Similar analytical procedures for measuring levels of inorganic chemicals (e.g., heavy metal contaminants like arsenic, chromium, and lead) in materials are found in the following sections provided in EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*: Method 3015A, “Microwave Assisted Acid Digestion of Aqueous Samples and Extracts,” and Method 6010D, “Inductively Coupled Plasma-~~Atomic~~ Optical Emission Spectrometry (ICP-OES) .” These procedures also involve analysis of a small material specimen. The specimen is digested in nitric acid and then treated with 50 percent hydrogen peroxide. The solution of the digested specimen is then diluted for analysis by atomic absorption or ion coupled plasma-atomic spectroscopy to identify and determine the amount of different inorganic substances.

Most tests for evaluating contamination levels of protective ensembles or ensemble elements will yield results that are reported in mass of contaminant per unit mass of the material, such as milligrams of contaminant per kilogram of material (mg/kg), which is equivalent to parts per million (ppm). In other cases, test results might be reported in the mass of contaminant per

unit area of material, such as micrograms per square centimeter of material (μg/cm^2). These types of measurements provide a quantity of contamination that can be extrapolated to the entire item, knowing its overall weight or surface area; however, that extrapolation assumes that the contamination is uniformly spread over the entire ensemble or ensemble element. This is generally not a valid assumption since contamination varies across the ensemble or ensemble element.

Establishment of the Testing Approach. Because these procedures are sensitive for quantifying many forms of contamination, any testing for measuring contamination levels should involve control tests. Control tests are separate measurements used to determine background contamination that might be present in the material or in residue left from the cleaning agents or cleaning procedures. Failure to consider such chemicals can interfere with the accuracy of measurements for actual contaminants. In general, the following control tests are needed:

(1) A test of the same material being analyzed without the contaminant present (e.g., material taken from PPE with a similar history but unexposed to the contaminants)

(2) A test of the same material that is not contaminated after washing that has been subjected to the cleaning process (e.g., a test on a piece of new material that has been cleaned using the subject cleaning agent and procedures)

The levels of residual contaminants from these control tests should be subtracted from the after-cleaning samples. The residual contamination from the first control test should be subtracted from the before-cleaning samples. Decontamination effectiveness can be determined by calculating the proportion of contaminant removed using the following equation:

$$\text{Percent decontamination efficiency} = \frac{\text{Initial level of } C \; - \; \text{Final level of } C}{\text{Initial level of } C} \times 100$$

~~[A.7.3.7.4]~~ [A

where:
C = contaminant

The decontamination effectiveness will vary with each contaminant because some contaminants can be removed more easily than others, given differences in the properties of the contaminant and the properties of the contaminated element materials. For example, chemicals such as hexane and benzene that evaporate easily will usually be removed easily compared with nonvolatile (nonevaporating) chemicals found in tars and oily chemicals.

Interpretation of Test Results. The remaining level of contaminant in a protective ensembles or ensemble element can be used to determine the potential risk to the wearer. However, there are no established safe levels of residual concentration levels for most contaminants. The decision to reuse a protective element based on known, measured levels of contamination should be undertaken by a trained professional familiar with the properties and hazards of the contaminant. Any uncertainty of the risk presented by residual contamination or of acceptable levels for continued use can be a cause for retirement and disposal of the protective item.

The procedures for measuring contamination levels in protective ensembles or ensemble elements are usually destructive in that they require that a specimen be taken from the item and subjected to extraction or digestion with a solvent. This requirement, in addition to the expense of the analytical testing, can make the decision to investigate contamination levels in protective ensembles or ensemble elements cost prohibitive.

Specimens of protective ensembles or ensemble elements taken for determination of contamination levels cannot be representative for all areas of the item being sampled. For example, a specimen taken from the pocket of a coat will not reflect the contamination level for the back of the coat or the bottom of trousers. In addition, sampling of one protective ensemble or ensemble element will not be representative of all ensembles or ensemble elements from a certain group that are or are suspected of being contaminated. Contamination levels for different protective ensembles or ensemble elements of the same type depend on the type of exposure, the condition of the protective element, and the care provided to the item.

Concerns over protective ensemble or ensemble element contamination can arise from a single incident involving a contamination event or can be an ongoing consideration as contaminants from routine situations accumulate in the ensemble(s) or ensemble element(s). Organizations can periodically sample ensembles and ensemble elements to determine the effectiveness of cleaning processes in removing harmful contaminants, but they should understand the limitations of the approach — specifically that sampling cannot be representative of all the protective ensembles and ensemble elements in use.

Further details about this information are provided in the report for the US Fire Administration (USFA), "Research, Testing, and Analysis on the Decontamination of Fire Fighting Protective Clothing and Equipment." A synopsis of the USFA report is provided in ASTM ~~STP1237~~ 14086S , ~~*Performance of*~~ *Evaluating the Effectiveness of Different Laundering Approaches for Decontaminating Structural Fire Fighting Protective Clothing*.

Overall Considerations for Contamination Testing. While testing for determining contamination in exposed or cleaned protective elements can be useful, it must be carefully performed by qualified laboratories with the results interpreted by knowledgeable individuals to provide an accurate assessment of cleaning effectiveness and any hazards associated with the reuse of protective clothing. This testing is generally expensive, is destructive of the element being tested, and takes some to have performed. Any decision to perform testing on contaminated clothing should weigh the costs for replacing the clothing versus the cost of testing and destruction of clothing items through testing.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 11:55:14 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The references are updated in accordance with the NFPA Manual of Style.

The reference to ASTM STP1237, which is a collection of papers presented at a symposium, is changed to ASTM STP14086S, which is the specific paper. Also, the title of the paper is corrected.

Response Message: SR-98-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 111-NFPA 1850-2024 [Section No. A.7.3.9.1(4)]

A.6.3.9.1(4)

At the time this edition was prepared, the technical committee recognized that, depending on the contaminant, the wash temperature maximum of 40°C (105°F) might not be the most effective temperature for cleaning those ensemble elements that can be subjected to higher wash temperatures in washer/extractors. However, even with this recognition, the technical committee was reluctant to increase the maximum wash temperature for advanced cleaning because it will occur more frequently than specialized cleaning or disinfection or sanitization and, to date, only limited testing has been done on the effects of multiple washings at 60°C (140°F) on garment ensembles and ensemble elements. Based on this work, there is a tradeoff between increasing the wash temperature for purposes of contaminant removal and the impact of the increased wash temperature for adversely affecting the performance properties of ensemble elements.

Effects of Increasing Wash Temperature for Removal of Contaminants. Firefighter protective ensembles and ensemble elements might be contaminated with soot and chemicals such as polynuclear aromatic hydrocarbons (PAHs), phenols, phthalates, hydrocarbons, heavy metals, and other hazardous materials during fire responses, various chemical compounds from hazmat responses, and microorganisms during medical responses or biohazard responses. Appropriate removal of these contaminants is necessary both for protecting the health of the firefighter and for ensuring that the gear performance is not compromised. To assess appropriate turnout cleaning parameters, specifically wash temperature, it is useful to consider the cleaning recommendations for garments used in agricultural and health care applications because such applications involve hazardous materials to which ensembles and ensemble elements might also be exposed: pesticides and infectious agents.

Extensive research has been performed to examine the effectiveness of different laundering procedures in removing pesticides. This information is relevant to firefighter ensembles and ensemble elements because pesticide chemicals have a range of properties that are similar to fireground chemicals in terms of low volatility and often low water solubility. Research from several sources has shown that higher wash temperatures of up to 60°C (140°F) have greater efficacy at removing pesticide contamination, as reported in the following references:

(1) Thostenson, A., et al. “Laundering Pesticide-contaminated Work Clothes (PS1778).” North Dakota State University Extension Service, January 2016.
www.ag.ndsu.edu/publications/crops/laundering-pesticide-contaminated-work-clothes/ps1778.pdf.

(2) Laughlin, J. “Decontaminating Pesticide Protective Clothing. *Reviews of Environmental Contamination and Toxicology* 130 (1993): 79–94. Springer, New York, NY.
https://doi.org/10.1007/978-1-4613-9763-2_3.

(3) Easley, C. B., J. Laughlin, and R. Gold. “Laundering Pesticide Contaminated Clothing.” Cornell University Cooperative Extension, Pesticide Safety Education Program (PSEP). NebGuide HEG81-152, November, 1981. Reprinted in 1984.
~~psep.cce.cornell.edu/facts-slides-self/facts/gen-posaf-laund.aspx.~~

As a consequence of these findings, various organizations recommend the use of hot water at 60°C (140°F) as well as other laundering procedures for the optimum removal of pesticides from work clothing.

Similarly, a number of studies have addressed the efficacy of increased water temperatures in killing bacteria and other microorganism contaminants in hospital laundry. As a consequence of this research, the Centers for Disease Control (CDC) and the Healthcare Infection Control Practices Advisory Committee (HICPAC) have recommended the use of specific laundering practices that include even higher temperatures at 71°C (160°F) in combination with bleach. (Note: This practice is not appropriate for firefighter protective ensembles and ensemble elements).

Clearly, high wash temperatures provide greater effectiveness in addressing many forms of contamination, but the use of higher temperatures must be weighed against its potential effects on the performance properties and continued service life of ensemble and ensemble elements.

Impact of Higher Wash Temperatures on Ensemble Element Materials and Components. To investigate the potential of applying higher wash temperatures, the technical committee conducted several laundering trials on unused materials, components, and full clothing both at

40°C (105°F) and at 60°C (140°F) to compare the overall impact of multiple launderings (60 cycles) at these temperatures. Multiple samples at several different facilities were subjected to conventional laundering procedures using both wash temperatures, with comprehensive inspections and assessment of certain performance properties after 20, 40, and 60 cycles of laundering. The preliminary findings of this work shows that components can be adversely affected by increased wash temperature and the increased cycles of laundering. Higher wash temperatures and multiple launderings created loss of certain performance properties for the actual material layers, and particular durability concerns were noted. At the time this work was conducted, it was not possible to fully conclude that safety issues would arise for protection of firefighters; however, garment elements laundered multiple times and at the higher wash temperature would clearly require more frequent repair and replacement of components.

Specific Considerations for Frequent Advanced Cleaning, Sanitization, and Specialized Cleaning. Organizations are cautioned to be aware of the tradeoffs that exist for increased laundering at higher wash temperatures. Higher wash temperatures are likely to be more effective in removing many contaminants but will also likely reduce the service life of or increase the number of repairs to garment elements and other ensemble elements. Increased cleaning creates additional wear and tear on garments, but, if handled properly and coupled with frequent inspections, ensemble element service can be optimized for both effective cleaning and retention of performance properties.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Sep 06 13:30:56 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The URL for the third reference is deleted because it is no longer active. Also, the publishing information is updated to identify the original publisher and date.

Response Message: SR-111-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 81-NFPA 1850-2024 [Section No. A.7.4.2]

A.6.4.2

Applicable regulations in 29 CFR 1910.1030, “Bloodborne Pathogens,” include observing universal precautions, instituting engineering and workplace controls, using appropriate PPE for personnel involved in the disinfection or sanitization and biological decontamination of PPE, and ensuring that the decontamination area is in a clean and sanitary condition. Universal precautions are applied to prevent contact with blood or other potentially infectious materials where all body fluids are considered potentially infectious materials. Engineering and workplace controls include the provision of hand-washing facilities and the prohibition of food and beverages in areas where handling of contaminated PPE and decontamination occur. They also include bagging and appropriately identifying body fluid–contaminated clothing using either a biohazard symbol or red bag to indicate potentially infectious materials. PPE includes the use of gloves, aprons, full torso coveralls or smocks, arm covers, and eye/face protection. At a minimum, persons involved in cleaning contaminated ensembles and ensemble elements should wear cleaning gloves, an apron and protectives sleeves or a coverall, and a pair of goggles or a faceshield that conforms to NFPA 1950. In addition, cleaning of contaminated ensembles and ensemble elements should take place in a designated area with sinks and counters made of materials, such as stainless steel, that can be adequately decontaminated following an element-cleaning procedure.

NFPA ~~1581~~ 1580 should be consulted for additional guidance.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Sat Aug 17 02:22:56 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1581 is updated to the consolidated NFPA 1580.

Response Message: SR-81-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.

Durby, Tim

Eysser, Christopher George

Green, Robert

McClintock, Steve W.

Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 112-NFPA 1850-2024 [Section No. A.7.4.3]

A.6.4.3

The contamination of protective ensembles or ensemble elements with body fluids or other potentially infectious materials, such as contaminated flood water, requires specific procedures for eliminating the health threats associated with microbial contamination. At a minimum, protective ensembles and ensemble elements should be subject to sanitization, where the levels of microbial contamination are reduced to acceptable levels, or disinfection, where all viable microbial contamination has been eliminated. In general, sanitization is most often applied to porous surface such as the fabrics and textiles associated with garments, helmets textile components, gloves, footwear, and hoods, whereas disinfection is applied to hard surfaces such as helmet shells.

In many cases, disinfection or sanitization is initially applied to the ensemble or ensemble element to inactivate the microbial contamination and is then followed up by advanced cleaning to further remove the soils associated with the contamination (e.g., blood and body fluid solid residue). Any sanitizer or disinfectant that is used on the ensemble or ensemble element should be registered with the EPA, which has approval processes for different types of sanitizers and disinfectants. The EPA has established guidelines for demonstrating the efficacy of both disinfectants and sanitizers. These procedures are established in the following publications:

(1) OCSPP 810.2200, “Disinfectants for Use on Environmental Surfaces — ~~Guide~~ Guidance for Efficacy Testing”

(2) OCSPP 810.2300, “Sanitizers for Use on Hard Surfaces — Efficacy Data Recommendations”

(3) OCSPP 810.2400, “Disinfectants and Sanitizers for Use on Fabrics and Textiles — Efficacy Data Recommendations”

A listing of currently registered disinfectants and sanitizers can be found at www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants.

However, in order to identify an appropriate sanitizer or disinfectant on the EPA’s directory, the EPA registration number, manufacturer name, or product name is needed. Many disinfectant and sanitizer products are rebranded and have a distributor number that appears after the primary manufacturer registration number. This listing also identifies specific disinfectants or sanitizers for effectiveness against specific types of infectious diseases. A recommended starting point is “~~List H.~~ EPA’s Registered Antimicrobial Products Effective Against Methicillin ~~Resistant~~ -resistant *Staphylococcus aureus* (MRSA) and/or Vancomycin ~~Resistant~~ -resistant *Enterococcus faecalis* ~~or~~ / *faecium* (VRE). [List H] ” Not all recommended listed disinfectants or sanitizers are suitable for protective ensembles or ensemble elements. Examine the product’s safety data sheet (SDS) for chemicals that might be harmful to the protective ensemble or ensemble element, particularly those with container pH outside the prescribed acceptable range of 6 to 9.5 specified in 6.3.7.2, or check with a verified ISP or the manufacturer of the ensemble or ensemble element for further advice. See 6.4.3.2 for additional information.

Where these product types are used, it is essential that instructions provided by the supplier be followed since the efficacy of their disinfection or sanitization is based on specific ratios of agent to water, residence time, and other application factors that were used to demonstrate the effectiveness of the product as a disinfectant or sanitizer. Use of too little product or under the wrong conditions might cause the product to be ineffective in achieving sanitization or disinfection. Unless specifically indicated as a laundry additive, many disinfectants and sanitizers are not to be used as part of the wash chemicals.

In some cases, certain laundering procedures or supplemental additives such as ozone could be effective in providing sanitization of clothing. If used with garments, the textile components of helmets, or hoods, however, these procedures/additives must be qualified as effective by meeting the requirements in 11.3.7.2 where specific testing is conducted to demonstrate sanitization efficacy.

Since disinfection and sanitization only affects microbial contamination, it must be followed up with advanced cleaning to remove any soils associated with the body fluid or other infectious material.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Sep 06 13:44:57 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The titles of referenced publications are corrected.

Response Message: SR-112-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 113-NFPA 1850-2024 [Section No. A.7.5.3]

A.6.5.3

Where certain types of contaminants are frequently encountered that warrant specialized cleaning, organizations should determine their capabilities and limitations with respect to cleaning both soiled and contaminated ensembles and ensemble elements that have been contaminated with specific substances outside of their normal capabilities for applying advanced cleaning. While it is possible that some forms of advanced cleaning might effectively remove these substances, the organization should obtain independent information indicating the efficacy of any applied specialized cleaning procedures.

The following are examples of specialized cleaning for three specific forms of contamination: asbestos, fentanyl and other synthetic opioid drugs, and bed bugs.

Asbestos. Given its established link to mesothelioma asbestosis, clothing known to be contaminated with asbestos fibers presents an elevated risk, and complete decontamination might not be possible. While the application of additional presoaking and rinse cycles in conjunction with advanced cleaning might remove the large majority of respirable asbestos fibers, some uncertainty still exists for the condition of the clothing following cleaning. In general, it is recommended that organizations work with ISPs capable of removing asbestos contamination if cleaning has been determined to be a viable option. It is further recommended that testing as described in A.6.5.4.5 be performed with any specialized cleaning of asbestos-contaminated protective ensembles or ensemble elements.

Fentanyl and Other Synthetic Opioid Drugs. Where ensemble or ensemble element exposure to fentanyl and/or other synthetic opioids has occurred, extreme care must be taken to ensure that any powder residue is not aerosolized into the breathing zone of the individual wearing the ensemble or ensemble element. It is highly recommended that individuals involved in the handling and cleaning of ensembles and ensemble elements contaminated with synthetic opioid drugs wear at least air-purifying respirators outfitted with P-100 particulate filters, given the severe effects from respirations of these drugs at very low concentrations. Highly absorbent wipes are recommended for the removal of any exterior deposited powder followed by rinsing with soap and water. Use of alcohol-based wipes for removal of contamination from exposed skin is not recommended because these types of products could increase the absorption of the drug into the wearer's skin. Detergents or other cleaning agents with a pH near neutral (7.0) should be used to wash products contaminated with these types of substances. Additional information related to the hazards and exposure control of fentanyl and other synthetic opioid drugs is available as follows:

(1) ~~Interagency~~ The InterAgency Board for Equipment Standardization and Interoperability, "Recommendations on Selection and Use of Personal Protective Equipment and Decontamination Products for First Responders Against Exposure Hazards to Synthetic Opioids, Including Fentanyl and Fentanyl Analogues," August 2017. ~~(interagencyboard.org/content/first-responder-ppe-and-decontamination-recommendations-fentanyl-august-2017)~~

(2) Center for Disease Control and Prevention (CDC), *Fentanyl: Emergency Responders at Risk* (www.cdc.gov/niosh/topics/fentanyl/risk.html)

(3) CDC~~'s 2018 interim report,~~ "Evaluation of Potential Occupational Exposures to Opioid Drugs During an Emergency Medical Services Response~~"~~ ," HHE 2018-0067, Interim Report, March 27, 2018.

Bed Bugs. Bed bugs are a frequent type of contamination for protective ensembles and ensemble elements, generally resulting from exposure to areas or items infested with bed bugs. Conventional laundry procedures are ineffective in removing bed bugs. More importantly, conventional laundry processes are insufficient to kill any eggs that might have been laid in the clothing item, which can cause the further spread of bed bugs. Two different approaches based on temperature extremes can be used to decontaminate ensembles and ensemble elements exposed to bed bugs. Using a wash temperature of 60°C (140°F) and a drying temperature above 49°C (120°F) for a minimum of 30 minutes has been determined to be effective in killing bed bug adults, nymphs, and eggs. Drying could be accomplished with a drying cabinet as long as the requisite temperature can be maintained over the minimum 30-minute period. If the clothing is wet, longer periods of drying might be necessary to ensure that the clothing reaches the temperature of 49°C (120°F) for an extended period of time. Alternatively, extremely cold temperatures of −21°C (−5°F) or below for at least 8 hours can be used for killing bed bug adults, nymphs, and their eggs, although longer freezing times are recommended because the mass of clothing can take a relatively long time to reach the

appropriate temperature. Documentation for the effectiveness of these test conditions is provided in Naylor and Boase, “Practical solutions for treating laundry infested with Cimex lectularius (Hemiptera: Cimicidae).” Mobile or stationary energy storage system fire decomposition products.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Sep 06 14:06:28 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The URL for the IAB paper is deleted because it is no longer active. The full title of the report is provided instead.

Additional information for the CDC references is added.

Response Message: SR-113-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 89-NFPA 1850-2024 [Section No. A.9.1.4]

A.9.1.4

Storage in extreme temperatures for extended periods can accelerate deterioration of ensembles and ensemble elements. A cold performance parameter of −32°C (−25°F) is used in ~~NFPA 1971 (incorporated in the 2024 edition of~~ NFPA 1970~~)~~ (1971) . Temperatures above 82°C (180°F) can cause some adhesives to lose their integrity.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Tue Sep 03 14:31:25 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

Response Message: SR-89-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 90-NFPA 1850-2024 [Section No. A.10.1.1]

A.10.1.1

Retirement criteria should be based on a number of factors, including, but not limited to, the following:

(1) Overall condition of the item

(2) Specific deterioration of materials or components beyond their economic repair

(3) Ability to adequately remove hazardous materials and other contaminants

(4) Age of structural or proximity ensemble or ensemble elements

(5) Excessive soil buildup that could impact performance of the ensemble or ensemble element

Physical damage from use, detrimental effects from improper cleaning procedures, and fabric failure of an ensemble and ensemble elements that can make repairs impossible are other factors that can affect when an item should be retired.

Where ensembles and ensemble elements are worn, damaged, or contaminated, organizations should determine if it would be more appropriate for them to be repaired, decontaminated, or replaced. One general guideline is if the cost of the repair or decontamination is greater than 70 percent of the replacement cost of the ensemble or ensemble elements, replacement should be considered. A typical guideline that can be used involves the use of a matrix that takes into account the current age of the gear and the cost of the repair versus the replacement cost of the item. *(See A.10.1.4.)*

Experience suggests that ensembles and ensemble elements that are approaching 10 years since the date of their manufacture have a high likelihood of performance deficiencies in multiple areas that can often be detected only by destructive testing. Additionally, experience suggests that the reflective outer shell of proximity elements that are approaching 5 years since the date of their manufacture have a high likelihood of performance failures that can be detected only by destructive testing. Such performance failures could compromise firefighter safety.

It is important to understand that the actual service life of ensembles and ensemble elements varies depending on the amount of their use and the care they receive. Factors such as the size of the department, area covered, types of exposures, and aggressiveness of the individual firefighter are all considerations in how long any ensemble element will last. It is possible that a protective element could be exposed to circumstances that totally destroy it the first time it is utilized. Since the purpose of firefighters' protective elements is to protect the wearer, if the element has saved a life or prevented serious injury, even just once, it has done its job. In many cases, an ensemble or ensemble element will need to be retired sooner than 10 years (or 5 years for the proximity reflective outer shell component).

An additional consideration that can influence the decision to repair or replace an ensemble or ensemble element centers on the advances in technology that occur through each revision of ~~NFPA 1971 (incorporated in the 2024 edition of~~ NFPA 1970~~)~~ (1971) . These technological advances might be deemed important enough by an organization to influence its criteria for replacement of ensembles or ensemble elements.

For every revision of this standard since the inclusion of the 10-year protective element retirement requirement, the technical committee has conducted a detailed assessment of its impact based on technical changes in ~~NFPA 1971 (incorporated in the 2024 edition of~~ NFPA 1970~~)~~ (1971) and the availability of new technology for nondestructive evaluation of continued protective element service.

For both the 2014 and ~~2019 revisions~~ 2020 editions of NFPA 1851, the technical committee spent considerable time on the issue of mandatory retirement. In each case, the technical committee reaffirmed its position based on the following factors:

(1) Since NFPA standards are revised every 5 years, 10 years represents two revision cycles that incorporate significant performance enhancements in ensembles and ensemble elements to warrant retirement of personal protective equipment (PPE) 10 years from the date of manufacture. Significant changes in the technology used in fibers, fabrics, components, and overall designs of firefighter protective ensembles and ensemble elements along with the test methods for their evaluation have advanced considerably over this period of time. For example, many materials that were used in protective

garments to meet the 2007 edition of NFPA 1971 are no longer available. Some of these differences in clothing technology can mean that firefighters operating on the same fireground wearing clothing certified to different editions of NFPA 1971or NFPA 1970 (1971) can have protective ensembles and elements that provide different levels of protection. These differences increase with each new edition ~~of NFPA 1971 (incorporated in the 2024 edition of NFPA 1970)~~ .

(2) In the absence of scientifically validated test methods that would support modifying or eliminating the current mandatory retirement of 10 years, the technical committee reaffirmed the existing 10-year requirement for all PPE. Around the time the 2014 edition of NFPA 1851 was released, research was carried out and documented by McQuerry, et al., in "A Post-use Evaluation of Turnout Gear Using NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting,* and NFPA 1851, *Standard on Selection, Care and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting."* The research examined over 250 garments, including 108 garments that had been retired, and found support for the 10-year retirement requirement on the basis of comprehensive inspections and testing of samples from gear for selected performance properties. The technical committee remains aware of ongoing research efforts to investigate the service life of firefighter protective ensembles and ensemble elements.

(3) In the absence of a nondestructive test or evaluation method that can conclusively and reliably determine that PPE remains compliant with the performance requirements in place at the time of manufacture, the technical committee continues to support the existing retirement criteria. Nearly all performance properties either require samples that must be cut from protective ensembles or ensemble elements or are destructive in the manner of testing. Through the date of the current revision, no single or combination of nondestructive test methods has been identified that permits confidence in fully assessing protective ensemble or ensemble element service life.

(4) Increasing concern for firefighter exposure to carcinogens and their retention in clothing, sometimes in spite of the frequent application of advanced cleaning, has provided an additional reason for maintaining the existing retirement criteria. Older ensembles and ensemble elements tend to absorb and retain low volatility carcinogens and other hazardous materials compared with new protective ensembles and ensemble elements. As with performance testing, the technology for nondestructive evaluations of contamination levels that can readily determine retention of persistent contaminants does not yet exist.

Organizations should include members who have received training in the inspection of ensembles and ensemble elements, who understand the limitations of each ensemble and ensemble element, and who recognize the signs of failure in the decision-making process as to the integrity of an ensemble or ensemble element. Organizations are further encouraged to ensure that inventories of protective ensembles and ensemble elements are effectively managed so that their full utility can be realized. Efficient rotation of clothing and use of spare ensembles and ensemble elements where available can help maximize their service life. Repurposing clean, expired ensembles or ensemble elements for use as training gear, exercise gear, public education gear, and demonstration gear are good alternatives for extending the nonfire use of retired gear.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Tue Sep 03 14:32:33 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on

product labeling.

References to other NFPA standards are corrected.

In the 2nd list item, the author(s) of the referenced paper are added to aid readers in finding the citation in the list of references.

Response Message: SR-90-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 114-NFPA 1850-2024 [Section No. A.10.1.2]

A.10.1.2

After discussion of the concept of mandatory retirement for protective elements, the consensus of the technical committee, led by the fire service segment, is that the life of a turnout suit is generally less than 10 years. Regardless of when the element was originally produced, it is imperative that the protective elements be routinely inspected to ensure that they are clean, well maintained, and still safe. Just knowing the age of the elements cannot do that. In the revision cycles for the 2014 and ~~2019 revision cycles~~ 2020 editions of NFPA 1851 , the technical committee, led by the fire service, again reaffirmed this position.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Fri Sep 06 15:15:55 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The previous edition year is corrected.

Response Message: SR-114-NFPA 1850-2024

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 91-NFPA 1850-2024 [Section No. A.10.1.5]

A.10.1.5

All structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements are required by NFPA 1970 to be certified by an independent, third-party certification organization. For an ensemble or ensemble element to meet the requirements of ~~NFPA 1971 , incorporated in the 2024 edition of~~ NFPA 1970 (1971) , the item should carry a statement on the product label stating compliance and the label, symbol, or other identifying mark of that certifying organization.

Third-party certification is an important means of ensuring the quality of ensembles and ensemble elements. To be certain than an item is properly certified, labeled, and listed, NFPA strongly recommends that prospective purchasers require appropriate evidence of certification for the specific product and model from the manufacturer before purchase. Prospective purchasers also should contact the certification organizations and request copies of the certification organization's list of certified products to the appropriate NFPA standard. This listing is required for third-party certification by ~~NFPA 1971 (incorporated in the 2024 edition of~~ NFPA 1970~~)~~ (1971) and is a service performed by the certification organization.

Details about certification and product labeling can be found in Chapters 4 and 5 of NFPA 1970 (1971) . Also, the definitions of *certification/certified* in Section 3.3 of NFPA ~~1971~~ 1970 and *labeled* and *listed* in Section 3.2 of this standard should be reviewed.

From time to time, NFPA receives complaints that certain items of structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements might be carrying labels falsely identifying them as compliant with an NFPA standard. NFPA advises those purchasing structural firefighting ensembles and ensemble elements and proximity firefighting ensembles and ensemble elements to be aware that any structural firefighting ensemble or ensemble element or proximity firefighting ensemble or ensemble element that does not bear the appropriate compliance statement and the mark of an independent, third-party certification organization is not compliant with ~~NFPA 1971 (incorporated in the 2024 edition of~~ NFPA 1970~~)~~ (1971) even if the product label states that the ensemble or ensemble element is compliant.

When an organization is in doubt as to the authenticity of a certification claim, the certification organization or the consumer protection agency of the state/provincial government should be contacted directly.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Tue Sep 03 14:36:47 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

Response Message: SR-91-NFPA 1850-2024

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 60-NFPA 1850-2024 [Section No. A.10.3.1]

A.10.3.1

When developing these procedures, the organization should coordinate with other agencies such as the medical examiner, law enforcement, or other experts to determine what actions are appropriate. Organizations can find additional guidance related to the processing of structural ensembles and ensemble elements and proximity ensembles and ensemble elements that are directly related to serious firefighter injuries and firefighter fatalities in the International Association of Fire Fighters manual, *Line of Duty Notification, Assistance, and Investigation Policy*, available at ~~www~~ https://lodd .iaff.org~~/safe/lodd.html~~ , and the International Association of Fire Chiefs guide for investigating a line-of-duty death, “LODD Response Plan,” available at www.iafc.org.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Aug 16 16:37:42 EDT 2024

Committee Statement

Committee Statement: The referenced URL is updated.
Response Message: SR-60-NFPA 1850-2024

Public Comment No. 24-NFPA 1850-2024 [Section No. A.10.3.1]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

There's more literature, policies, and guidelines that we should list from different states, organizations, and departments.

Stull, Jeffrey O.

Agree

Second Revision No. 103-NFPA 1850-2024 [Section No. A.11.1.1.1]

A.11.1.1.1

Organizations should look at the listed capabilities indicated by the certification organization for verified ISPs to determine which moisture barriers can be repaired prior to requesting repair work on their garments. The ISP's or organization's certificate or the certification organization's website should also be reviewed.

See A.11.3.7.1 for an explanation of the minimum advanced cleaning efficiencies for semivolatile organic compounds and heavy metals.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Wed Sep 04 13:56:14 EDT 2024

Committee Statement

Committee Statement: Additional annex language has been added to explain that no changes were made for cleaning verification contamination removal efficiencies.

Response Message: SR-103-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 121-NFPA 1850-2024 [Section No. A.11.2.16]

A.11.2.16

The certification organization should establish procedures for when complaints are submitted. These procedures should comply with the provisions of ISO ~~Guide 27, *Guidelines for corrective action to be taken by a certification body in the event of misuse of its mark of conformity*~~ /IEC 17030, *Conformity assessment — General requirements for third-party marks of conformity* , and as modified herein.

For the purposes of defining noncompliant cleaning or repairs of ensemble elements, a valid report should include any specific approach to cleaning or repair that is not authorized by the manufacturer of the ensemble element and that does not meet the one or more of the respective applicable requirements for cleaning in accordance with Chapter 6 or for repairs in accordance with Chapter 8.

Where a report of potentially noncompliant cleaning or repairs is provided, the certification organization should make an assessment of the severity of the noncompliance and its consequences to the safety and health of users. This assessment should involve the certification organization consulting with the manufacturer of the affected ensemble element(s).

Where a complaint of potentially noncompliant cleaning or repairs is provided, the certification organization should determine the scope of the services as applied to ensemble element(s) in terms of the period of time for which the noncompliant cleaning or repairs had occurred, if possible.

The certification organization should conduct the investigation with input from the verified ISP or verified organization providing the cleaning or repairs. Where findings conclude that the verified ISP's or verified organization's specific cleaning or repairs are noncompliant with this standard and the certification organization's appeal procedures referenced in 11.2.14 have been followed, the certification organization should take one or more of the following corrective actions:

(1) Require the verified ISP or verified organization to institute changes in its procedures to bring its cleaning or repairs into compliance with this standard

(2) Require the verified ISP or verified organization to notify those parties or individuals affected by the noncompliant cleaning or repairs

(3) Require the verified ISP or verified organization to perform compliant cleaning or repairs on the affected ensemble elements when such recleaning of ensemble elements or performance of additional repairs is necessary to protect the users

(4) Remove the verified ISP or verified organization from its verification program if it refuses to comply with the certification organization's corrective action indicated as part of its investigation

The certification organization should provide the findings of the investigation to the appropriate parties.

Where a change to this standard is necessary as a result of the investigation, the certification organization should submit either a Public Input for a proposed change to the next revision of this standard or a proposed Temporary Interim Amendment (TIA) to the current edition of this standard.

Submitter Information Verification

Committee: FAE-SPF

Submittal Date: Sun Sep 08 20:47:04 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

ISO Guide 27 was withdrawn and replaced by ISO 17030.

Response Message: SR-121-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 115-NFPA 1850-2024 [Section No. A.12.4.12.6.1.3]

A.13.4.12.6.1.3

EPA Method ASTM 6010D, “Inductively Coupled Plasma~~,~~ -Optical Emission Spectrometry (ICP-OES)” can be adapted for use with textile sample matrices for performing this type of analysis for heavy metal contaminants.

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Sep 06 15:49:59 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The title of ASTM 6010D is corrected.

Response Message: SR-115-NFPA 1850-2024

Ballot Results

This item has passed ballot

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas

Deaton, Anthoney Shawn

Dennison, Tyler J.

Falkenstein-Smith, Ryan

Fanning, David P.

Fesik, Sr., Jonathan

Forester, Crystal D.

Herring, Todd

Kiser, Jonathan Britt

Lehtonen, Karen E.

Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 92-NFPA 1850-2024 [Section No. D.2]

D.2 Risk Assessment.

A fire agency risk assessment's (RA) primary focus is to establish requirements for the design, performance, and testing of protective ensembles and ensemble elements that provide head, limb, hand, foot, torso, and interface protection for firefighters and other emergency service responders. Evaluation of current structural firefighting operations are essential to determine overall risk and potential environmental hazards; and, by extension, essential to determination of agency-specific personal protective equipment (PPE) requirements and liabilities. [~~(*See NFPA 1971 , incorporated in the 2024 edition of NFPA 1970.)*~~ (1971).] Analysis of incidents involving structural firefighting operations should be considered when evaluating needed protection from the potential hazards associated with structural firefighting that the fire agency is responsible for protecting as defined in ~~NFPA 1971, incorporated in the 2024 edition of~~ NFPA 1970 (1971) .

The purpose of the risk assessment (RA) and hazard evaluation (HE) is to provide the most suitable firefighting ensembles and ensemble elements for the agency's firefighting personnel. The RA assists the organization to evaluate the risks and hazards their emergency responders face. Based on the identified risks and hazards and other agency-specific needs, each protective clothing element is evaluated to ensure it provides the emergency responders with the most effective protection from the identified risks and hazards.

This standard should not be utilized as a detailed manufacturing or purchasing specification but instead be referenced in purchase specifications as the minimum requirements.

All forms of PPE have design and performance standards and within those standards have limitations. It is imperative that firefighters understand the protection limitations of their PPE to avoid incorrect use or reliance on an item intended to protect them from harm but might contribute to injury or illness if used incorrectly.

The health risks and safety hazards identified in this RA are based on the requirements of NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Firefighting and Proximity Firefighting.*

PPE is meant to reduce the firefighter's hazard exposure to acceptable levels where other means are not feasible or effective. However, all PPE has its protective limitations. When those limitations are exceeded, the wearer can be exposed to even greater harm. There are several terms that firefighters should be familiar with to better understand the performance expectations and limitations of their PPE, such as: *flashover, backdraft, chemical exposure, hazardous materials, terrorist attacks,* and so forth. This is not an inclusive list for the user.

The intent of this RA is to assist department officials in updating and clearly defining the standard for proper protection levels.

There are three levels of protection serving firefighters in the field, as follows:

(1) Administrative control

(2) Engineering controls

(3) PPE

Administrative controls are policies and procedures that teach and direct Individuals how to recognize and prevent workplace exposures, injuries, and illnesses.

Engineering controls are used to remove hazard(s) from the workplace. Such controls include shutting off the utilities at a structural fire, establishing physical barriers such as seat belts, or Lock out/Tag out procedures and barricades to isolate the firefighter from physically encountering the hazard.

Where exposure to hazards cannot be eliminated through administrative or engineering controls, PPE such as gloves, boots, safety glasses, garments, and respirators can be used to create a barrier between responders and the hazard(s). PPE is the basic control measure, as it does not remove the hazard. PPE will protect the firefighter so long as it is used in a manner that is within design specifications and limitations. PPE is meant to reduce the firefighter's exposure to acceptable levels when other functions of control are not feasible or effective.

Submitter Information Verification

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Submittal Date: Tue Sep 03 14:43:38 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

The reference to NFPA 1970 (1971) is revised to correlate with way it appears on product labeling.

Response Message: SR-92-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry

McKenna, Michael F.

Newsom, Amanda H.

Overbaugh, Ann

Ragan, Tom

Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree

Second Revision No. 72-NFPA 1850-2024 [Section No. E.1.2]

F.1.2 Other Publications.

F.1.2.1 AATCC Publications.

American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709-2215.

AATCC TM127, *Test Method for Water Resistance: Hydrostatic Pressure Test*, 2017 (2018)e.

F.1.2.2 ACGIH Publications.

American Conference of Governmental Industrial Hygienists, 1330 Kemper Meadow Drive, Cincinnati, OH 45240-1634.

~~*2016* *Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)*~~. https://www.acgih.org/science/tlv-bei-guidelines/

F.1.2.3 ANSI Publications.

American National Standards Institute, Inc., ~~25 West 43rd Street, 4th Floor~~ 1180 Avenue of the Americas, 10th Floor , New York, NY 10036.

ANSI/AIHA/ASSE Z88.6, *Respiratory Protection — Respirator Use — Physical Qualifications for Personnel*, 2006.

ANSI/ISEA Z87.1, *American National Standard for Occupational and Educational Personal Eye and Face Protection Devices*, 2020.

ANSI/ISEA 107, *American National Standard for High-Visibility Safety Apparel*, 2020.

ANSI/ISEA 113, *American National Standard for Fixed and Portable Decontamination Shower Units*, 2013.

ANSI/ISEA 207, *American National Standard for High-Visibility Public Safety Vests*, 2011.

F.1.2.4 ASTM Publications.

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D5755, *Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Surface Loading*, 2009 (2014)e1 (withdrawn 2023) .

ASTM E2274, *Standard Test Method for Evaluation of Laundry Sanitizers and Disinfectants*, 2016.

ASTM F1731, *Standard Practice for Body Measurements and Sizing of Fire and Rescue Services Uniforms and Other Thermal Hazard Protective Clothing*, 2021.

ASTM F1930, *Standard Test Method for Evaluation of Flame-Resistant Clothing for Protection Against Fire Simulations Using an Instrumented Manikin*, ~~2018~~ 2023 .

ASTM ~~STP1237~~ STP14086S , ~~*Performance of*~~ *Evaluating the Effectiveness of Different Laundering Approaches for Decontaminating Structural Fire Fighting Protective Clothing*, ~~5th volume,~~ 1996. https://www.astm.org/stp14086s.html

ASTM ~~STP1386~~ STP14465S , *Field Evaluation of Protective Clothing Effects on Fire Fighter Physiology: Predictive Capability of Total Heat Loss Test*, 2000. https://www.astm.org/stp14465s.html

F.1.2.5 EPA Publications.

Environmental Protection Agency, William Jefferson Clinton East Building, 1200 Pennsylvania Avenue, NW, Washington, DC 20460.

Selected EPA-Registered Disinfectants, www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants.

EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. The specific methods cited can be downloaded at https://www.epa.gov/hw-sw846.

Method 3015A, "Microwave Assisted Acid Digestion of Aqueous Samples and Extracts," February 2007.

Method 3050B, "Acid Digestion of Sediments, Sludges, and Soils," December 1996.

Method 3540C, "Soxhlet Extraction," December 1996.

Method 6010D, "Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES) ," July 2018.

Method 8270E, "Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC~~/~~ - MS)," ~~2007~~ 2018 .

OCSPP 810.2200, "Disinfectants for Use on Environmental Surfaces — ~~Guide~~ Guidance for Efficacy Testing," *EPA Series 810 — Product Performance Test Guidelines*, ~~September 2012~~ February 2018 .

OCSPP 810.2300, "Sanitizers for Use on Hard Surfaces — Efficacy Data Recommendations," *EPA Series 810 — Product Performance Test Guidelines*, September 2012.

OCSPP 810.2400, "Disinfectants and Sanitizers for Use on Fabrics and Textiles — Efficacy ~~Date~~ Data Recommendations," *EPA Series 810 — Product Performance Test Guidelines*, ~~March 2013~~ December 2012 .

F.1.2.6 IAFC Publications.

International Association of Fire Chiefs, 4025 Fair Ridge Drive, Suite 300, Fairfax, VA 22033-2868.

"LODD Response Plan," www.iafc.org~~/topics-and-tools/resources/resource/line-of-duty-death-resources~~ .

F.1.2.7 IAFF Publications.

International Association of Fire Fighters, 1750 New York Avenue, NW, Suite 300, Washington, DC 20006-5395.

Line of Duty Notification, Assistance, and Investigation Policy, ~~http://client.prod.iaff.org/#contentid=369~~ https://lodd.iaff.org .

F.1.2.8 InterAgency Board Publications.

InterAgency Board, 1550 Crystal Drive Suite 601, Arlington VA 22202.

"Recommendations on Selection and Use of Personal Protective Equipment and Decontamination Products for First Responders Against Exposure Hazards to Synthetic Opioids, Including Fentanyl and Fentanyl Analogues," August 2017.

F.1.2.9 ISO Publications.

International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

~~ISO Guide 27, *Guidelines for corrective action to be taken by a certification body in the event of misuse of its mark of conformity* , 1983, reconfirmed 2014.~~

ISO/IEC 17030, *Conformity assessment — General requirements for third-party marks of conformity* , 2021.

ISO/IEC 17065, *Conformity assessment — Requirements for bodies certifying products, processes and services*, 2012.

F.1.2.10 US Government Publications.

US Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

Center for Disease Control and Prevention (CDC), *Fentanyl: Emergency Responders at Risk* (www.cdc.gov/niosh/topics/fentanyl/risk.html)

Chiu S, Hornsby-Myers J, Dowell C, Trout D. "Evaluation of occupational exposures to illicit drugs during an emergency medical services response." Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH), Health Hazard Evaluation Report 2018-0067-3312, https://www.cdc.gov/niosh/hhe/reports/pdfs/2018-0067-3312.pdf.

Federal Highway Administration (FHA) *Manual on Uniform Traffic Control Devices*, 2012.

National Institute for Occupational Safety and Health (NIOSH), *Occupational Cancer* . https://www.cdc.gov/niosh/cancer/about/index.html

~~Title 29, Code of Federal Regulations, Part 1910.156, 7 August 2012.~~

Title 29, Code of Federal Regulations, Part 1910.1030, "Bloodborne Pathogens."

Title 49, Code of Federal Regulations, Parts 100–199~~, 1999~~ .

US National Toxicology Program (NTP): https://ntp.niehs.nih.gov/pubhealth/roc/index-1.html#toc1

F.1.2.11 USFA Publications.

US Fire Administration, 16825 South Seton Avenue, Emmitsburg, MD 21727.

"Research, Testing and Analysis on the Decontamination of Fire Fighting Protective Clothing and Equipment." (A synopsis of this report is provided in ASTM STP1237, *Performance of Protective Clothing*.)

F.1.2.12 Other Publications.

Easley, C. B., J. Laughlin, and R. Gold. “Laundering Pesticide Contaminated Clothing.” ~~Cornell University Cooperative Extension, Pesticide Safety Education Program (PSEP). psep.cce.cornell.edu/facts-slides-self/facts/gen-posaf-laund.aspx~~ NebGuide HEG81-152, November, 1981. Reprinted in 1984 .

Gao, Huipu, et al. “Relationship between heat loss indexes and physiological indicators of turnout-related heat strain in mild and hot environments.” *International journal of occupational safety and ergonomics* , 29.2 (2023): 562–572.

Han, Z. Y., Weng, W. G., & Huang, Q. Y. “Characterizations of particle size distribution of the droplets exhaled by sneeze,” *Journal of the Royal Society Interface* , 10(88), 20130560, 2013.

International Agency for Research on Cancer (IARC): http://monographs.iarc.fr/ENG/Classification/

~~Kent, K. W., et al. “Contamination of firefighter personal protective equipment and skin and the effectiveness of decontamination procedures,” *Journal of Occupational and Environmental Hygiene* 14(9): 801–814, June 2017.~~

Laughlin, J. “Decontaminating Pesticide Protective Clothing.” *Reviews of Environmental Contamination and Toxicology* 130 (1993): 79–94. Springer, New York, NY. https://doi.org/10.1007/978-1-4613-9763-2_3.

Lindsley, W. G., Pearce, T. A., Hudnall, J. B., Davis, K. A., Davis, S. M., Fisher, M. A., & Coffey, C. C. “Quantity and size distribution of cough-generated aerosol particles produced by influenza patients during and after illness,” *Journal of Occupational and Environmental Hygiene* , 9(7), 443–449, 2012.

McQuerry, M., A. Hummel, R. Barker, and S. Deaton. “The Cost of a Pocket: How Additional Reinforcements Impact THL & TPP.” *Fire Engineering* 168, no. 12 (2015): 78–79.

McQuerry, M., S. Klausing, D. Cotterill, and E. Easter. “A Post-use Evaluation of Turnout Gear Using NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting*, and NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting.” Fire Technology* 51, no. 5 (2015): 1149–1166.

Naylor, R. A., and C. J. Boase. “Practical solutions for treating laundry infested with Cimex lectularius (Hemiptera: Cimicidae).” *Journal of Economic Entomology* 103(1): 136–139, February 2010.

~~Report #HP170626, “A Report to FIERO on Total Heat Loss and Evaporative Resistance Measurements of Eight Firefighter Composites.” Textile Protection and Comfort Center (T-PACC), College of Textiles, North Carolina State University, June 2017.~~

~~Report #PSM170626, “A Report to FIERO on Phase II Testing: Predicted Physiological Responses from Eight Firefighting Suits Tested in Three Environmental Conditions.” Textile Protection and Comfort Center (T-PACC), College of Textiles, North Carolina State University, June 2017.~~

Thostenson, A., et al. “Laundering Pesticide-contaminated Work Clothes (PS1778).” North Dakota State University Extension Service, January 2016. www.ag.ndsu.edu/publications/crops/laundering-pesticide-contaminated-work-clothes/ps1778.pdf.

Supplemental Information

File Name	Description	Approved
1850_SPF_SR72_E.1.docx	staff use	
1850_SPF_E.1.1.docx	for editorial use	
1850_SR-72_E.1.2_SPF_legislative_changes.docx	for prod use	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Sat Aug 17 01:05:12 EDT 2024

Committee Statement

Committee Statement: References are updated in accordance with the Manual of Style.
Response Message: SR-72-NFPA 1850-2024

Public Comment No. 60-NFPA 1850-2024 [Chapter E]

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All
Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann

Ragan, Tom
Shiels, Brian P.
Silvestri, Daniel
Simmonds, Robert
Theriault, Daniel J.
Tomlinson, Tim W.
Tutterow, Jr., Robert D.
Weise, Dick
Winer, Harry P.

Affirmative with Comment

Cinque, Vince
Agreed
McMillan, Neil
agree
Reidy, Jim
x
Stull, Jeffrey O.
Agree

Second Revision No. 119-NFPA 1850-2024 [Section No. E.2]

F.2 Informational References.

The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

F.2.1 CGA Publications.

Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151-1788.

CGA C-6.2, *Standard for the Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders*, ~~2013~~ 2019 .

F.2.2 DOT Special Permits.

~~Associate Administrator for Department of Transportation, Washington, DC 20590, Attention: DHM-31.~~ Hazardous Materials General Approvals and Special Permits, US Department of Transportation, Pipeline and Hazardous Materials Safety Administration, 1200 New Jersey Avenue, SE, Washington, DC 20590, United States. specialpermits@dot.gov

F.2.3 PSI-PCI Publications.

Professional Scuba Inspectors, Inc. (PSI)/Professional Cylinder Inspectors (PCI) , 1183 University Drive, Suite 105-226, Burlington, NC ~~27216~~ 27215 . www.psicylinders.com

High, William L. ~~High~~ , and Mark A. Gresham *Inspecting Cylinders*, 5th edition .

SCBA Visual Cylinder ~~Technician~~ Inspection~~, Training, and Certification~~ (training course) .

F.2.4 US Government Publications.

US Government Publishing Office, 732 North Capitol Street, NW, Washington, DC ~~20401-0001.NIOSH Publication No. 2005-149,~~ *NIOSH Pocket Guide to Chemical Hazards Mobile Application* ~~, September 2005~~ .

Title 29, Code of Federal Regulations, Part 1910.120, “Hazardous Waste Operations and Emergency Response~~,~~ . ”~~ August 22, 1994.~~

F.2.5 Other Publications.

Kent, K. W., et al. “Contamination of firefighter personal protective equipment and skin and the effectiveness of decontamination procedures,” *Journal of Occupational and Environmental Hygiene* 14(9): 801–814, June 2017.

Supplemental Information

File Name	Description	Approved
1850_SPF_SR119_E.2.docx	Staff use - Section E.2 Informational References	

Submitter Information Verification

Committee: FAE-SPF
Submittal Date: Fri Sep 06 17:25:03 EDT 2024

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NFPA Standards (nfpa.org/regs).

References are updated in accordance with the NFPA Manual of Style.

Response Message: SR-119-NFPA 1850-2024

Ballot Results

✔ **This item has passed ballot**

33 Eligible Voters
6 Not Returned
23 Affirmative All
4 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Berger, George E.
Durby, Tim
Eysser, Christopher George
Green, Robert
McClintock, Steve W.
Sisson, Kelly

Affirmative All

Cox, Matthew Thomas
Deaton, Anthoney Shawn
Dennison, Tyler J.
Falkenstein-Smith, Ryan
Fanning, David P.
Fesik, Sr., Jonathan
Forester, Crystal D.
Herring, Todd
Kiser, Jonathan Britt
Lehtonen, Karen E.
Marshall, Webster Henry
McKenna, Michael F.
Newsom, Amanda H.
Overbaugh, Ann
Ragan, Tom
Shiels, Brian P.

Silvestri, Daniel

Simmonds, Robert

Theriault, Daniel J.

Tomlinson, Tim W.

Tutterow, Jr., Robert D.

Weise, Dick

Winer, Harry P.

Affirmative with Comment

Cinque, Vince

Agreed

McMillan, Neil

agree

Reidy, Jim

x

Stull, Jeffrey O.

Agree