

NFPA 1970-P2025 Edition

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

TIA Log No.: 1787

Reference: 2.3.5, 9.9.4 (re: flame after fuel exposure)

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www.nfpa.org/1970

1. Add a new reference to 2.3.5 to read as follows:

2.3.5 ASTM Publications.

ASTM D975, Standard Specification for Diesel Fuel, 2021.

2. Revise section 9.9.4 to read as follows:

9.9.4 Flame Resistance Following Fuel Exposure and Cleaning Test.

9.9.4.1 Application. This test shall apply to garment outer shells.

9.9.4.2 Sample Preparation.

9.9.4.2.1 Samples shall measure at least 1 m² (1 yd²).

~~9.9.4.2.2~~ ~~Samples shall be conditioned in 9.1.3.~~

~~9.9.4.2.3~~ ~~9.9.4.2.2~~ Additional samples Samples shall be conditioned as specified in 9.1.2 using 10 laundering cycles followed by conditioning as specified in 9.1.3.

9.9.4.3 Specimens.

9.9.4.3.1 Specimens shall be sized 235 mm × 360 mm (9.4 in. × 14.1 in.).

9.9.4.3.2 A test specimen smaller in the width direction across the test apparatus trough than specified in 9.9.4.3.1 shall be permitted if it can be demonstrated that the flow of liquid down the specimen stays on the specimen during the application of the liquid exposure.

9.9.4.3.3 A minimum of six specimens shall be tested, with three specimens in each material direction for both ~~room temperature and post-laundering~~ conditions in Table 9.9.4.3.3: post-fuel contamination (Condition 1) and post-fuel contamination followed by cleaning (Condition 2).

Table 9.9.4.3.3 Testing Procedures

<u>Reference</u>	<u>Condition 1</u>	<u>Condition 2</u>
<u>9.9.4.5.1</u>	<u>Fuel contamination</u>	<u>Fuel contamination</u>
<u>9.9.4.5.2</u>	<u>N/A</u>	<u>Cleaning</u> <i>(within 24 hours of 9.9.4.5.1)</i>
<u>9.9.4.5.3.1</u> <u>9.9.4.5.3.1.1</u>	<u>N/A</u>	<u>Flame resistance test 1</u> <i>(within 24 hours of 9.9.4.5.2)</i>
<u>9.9.4.5.3.2</u> <u>9.9.4.5.3.2.1</u>	<u>Flame resistance test 1</u> <i>(within 4 hours of 9.9.4.5.1)</i>	<u>N/A</u>

9.9.4.4 Apparatus. The exposure test apparatus and related equipment specified in ISO 6530, *Protective clothing – Protection against liquid chemicals – Test method for resistance of materials to penetration by liquids*, shall be used.

9.9.4.5 Procedure.

9.9.4.5.1 Specimens for both Condition 1 and Condition 2 in Table 9.9.4.3.3 ~~subject to room temperature conditioning only~~ shall be tested as specified in ISO 6530, *Protective clothing – Protection against liquid chemicals – Test method for resistance of materials to penetration*

by liquids, against Grade No. 2-D S15 diesel fuel as specified in ASTM D975, *Standard Specification for Diesel Fuel*, with the measurement of the index of repellency, index of penetration, and index of absorption.

9.9.4.5.2 For Condition 2 in Table 9.9.4.3.3, within 24 hours, +2/–0 hours, of the testing procedures in 9.9.4.5.1, diesel-fuel-contaminated specimens shall be subject to one cycle of washing and drying as specified in 9.1.12 with the following modifications:

1. If ballast is needed to reach load capacity, ballast as specified in 12.4.4.3 of NFPA 1851 shall be used.
2. AATCC High Efficiency (HE) Standard Reference Liquid Detergent WOB (without optical brighteners), at a ratio of 38 mL/3.8L ±1% water shall be used.
3. Air drying and forced-air drying as specified in 9.1.12.5 shall not be permitted.
4. Specimens shall be washed and dried for a total of 1 cycle.

9.9.4.5.3 Contaminated specimens shall be tested as specified in either 9.9.4.5.3.1 for Condition 1 in Table 9.9.4.3.3 or 9.9.4.5.3.2 for Condition 2 in Table 9.9.4.3.3.

9.9.4.5.3.1 Within 24 hours, +2/–0 hours, of the completion of the cleaning procedures as specified in 9.9.4.5.2, a 75 mm × 305 mm (3 in. × 12 in.) specimen shall be removed from each cleaned, contaminated specimen such that the new specimen's bottom edge coincides with the drip edge of the diesel exposure.

9.9.4.5.3.1.1 Within 24 hours, +2/–0 hours, of the cleaning procedures described in 9.9.4.5.2, each specimen shall be subjected to flame resistance testing as specified in 9.2.1.

9.9.4.5.3.2 Within 4 hours, +15/–0 minutes, of the testing as described in 9.9.4.5.1, a 75 mm × 305 mm (3 in. × 12 in.) specimen shall be removed from each contaminated specimen, such that the new specimen's bottom edge coincides with the drip edge of the diesel exposure.

9.9.4.5.3.2.1 Within 4 hours, +15/–0 minutes, of the testing as described in 9.9.4.5.1, each specimen shall be subjected to flame resistance testing as specified in 9.2.1.

9.9.4.5.2 Within 4 hours, +15/–0 minutes, of testing in accordance with ISO 6530, *Protective clothing—Protection against liquid chemicals—Test method for resistance of materials to penetration by liquids*, a 75 mm × 305 mm (3 in. × 12 in.) specimen shall be removed from each washed, contaminated specimen such that the new specimen's bottom edge coincides with the drip edge of the diesel exposure.

9.9.4.5.3 Each specimen shall be subjected to flame resistance testing as specified in Section 9.2.2.

9.9.4.5.4 Additional specimens subject to laundering conditioning shall be tested as specified in ISO 6530, *Protective clothing—Protection against liquid chemicals—Test method for resistance of materials to penetration by liquids*, against diesel fuel with the measurement of the index of repellency, index of penetration, and index of absorption.

9.9.4.5.5 Within 24 hours, +2/–0 hours, of testing in accordance with ISO 6530, *Protective clothing—Protection against liquid chemicals—Test method for resistance of materials to penetration by liquids*, diesel fuel contaminated specimens shall be subject to one cycle of laundering using a washer/extractor as specified in A.7.3.9(5)(a) of NFPA 1851, with 3.8 L (1.0 gal) AATCC liquid detergent per 3.8 L (1.0 gal) of wash water.

9.9.4.5.6 Within 24 hours, +2/–0 hours, of the laundering, a 75 mm × 305 mm (3 in. × 12 in.) specimen shall be removed from each washed, contaminated specimen such that the new specimen's bottom edge coincides with the drip edge of the diesel exposure specimen.

9.9.4.5.7 Each specimen shall be subjected to flame resistance testing as specified in Section 9.2.2.

9.9.4.6 Report.

9.9.4.6.1 The indices of repellency, penetration, and absorption shall be reported for each specimen as well as the average indices for each material direction for each condition in Table 9.9.4.3.3 ~~both room temperature and laundering conditioned samples.~~

9.9.4.6.2 The flame resistance results as specified in 9.2.1 ~~Section 9.2.2~~ shall be reported for each specimen with the average afterflame time and char length calculated for each material direction for each condition in Table 9.9.4.3.3 ~~both room temperature and laundering conditioned samples.~~

9.9.4.6.3 For comparison purposes, the ordinary flame resistance results for the respective outer shell material shall be provided alongside the test results described in 9.9.4.6.2.

Substantiation: The language in the 2nd draft is not able to be applied consistently across labs due to the following missing specifications:

1. Specified Grade No. 2-D S15 diesel fuel, as described in ASTM D975, since 7 grades of diesel fuel are available.
2. Corrected flame resistance testing references from 9.2.2 to 9.2.1.
3. Corrected and clarified the two conditions to be tested.
4. Cleaning procedures were revised to reflect 9.1.12 procedures in NFPA 1970, with modifications related to align soap, ballast, etc. with NFPA 1851, considering the following gaps:
 1. Second draft language:
 - a. Specifies no drying procedures.
 - b. Specifies no washer capacity.
 - c. Specifies no wash load.
 - d. Specifies no ballast material.

This TIA intends to correct the document so that it can be more consistently applied between laboratories. The changes being proposed are based on this study:

<https://journals.sagepub.com/doi/full/10.1177/15280837231217401>

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process.

The standard as written does not offer enough specificity to consistently test materials between labs.

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