

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.: 1791

Reference: Various in Chapters 8 and 9 (re: UV light degradation resistance test)

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www.nfpa.org/1970

1. *Add a new 8.1.28 and associated Annex material to read as follows:*

8.1.28* Garment moisture barrier materials shall be tested for resistance to light degradation as specified in 9.4.10, Light Degradation Resistance Test, and demonstrate passing performance.

A.8.1.28 The method for the light degradation test, while similar to the test method described in Section 8.62 of the 2018 edition of NFPA 1971, includes a significant modification to how the test method was previously performed where in the new test for this edition, the moisture barrier is sandwiched between a layer of a specified outer shell and thermal barrier, and the UV light exposure occurs directly on the outer shell side of the three-layer composite. This results in the attenuation of the UV light energy impingement to the moisture barrier as would be expected in actual garment configuration and use.

2. *Add a new 9.4.10. and associated Annex material to read as follows:*

9.4.10* Light Degradation Resistance Test.

A.9.4.10 See A.8.1.28.

9.4.10.1 Application. This test method shall apply to moisture barrier materials.

9.4.10.2 Samples.

9.4.10.2.1 Samples for conditioning shall be at least a 380 mm (15 in.) square and consist of a composite constructed using one layer of 7.5 oz woven 93 percent meta-aramid, 5 percent para-aramid, 2 percent antistat fiber, the moisture barrier being tested, and one layer of 3.8 oz \pm 0.3 oz, aramid needle punched nonwoven, quilted to a 3.4 oz \pm 0.2 oz, aramid woven plain weave thermal barrier material. The three-layer composite sample shall be stitched around the entire periphery.

9.4.10.2.2 Six composite samples shall be prepared.

9.4.10.3 Sample Preparation.

9.4.10.3.1 Sample composites shall be subjected to two cycles of the following conditioning:

(1) The sample shall first be subjected to the procedure specified in 9.1.2.

(2) The sample shall then be conditioned as specified in 9.1.3.

(3) The sample shall then be conditioned as specified in 9.1.5.

(4) The sample shall then be conditioned at a temperature of 21°C \pm 3°C (70°F \pm 5°F), and a relative humidity of 65 percent \pm 5 percent for at least 4 hours.

9.4.10.3.2 After subjecting the composite to the conditioning procedure in 9.62.3.1, the three-layer composite shall be subjected to UV light in accordance with ASTM G155, *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials*, with the following modifications:

(1) Cycle 8 exposure conditions shall be used.

- (2) Both inner and outer filters shall be borosilicate.
- (3) The exposure duration shall not include dark cycles.
- (4) Specimens shall be subjected to 40 hours of continuous light exposure.
- (5) Three of the samples shall be oriented so that the outer shell is facing the light source.
- (6) Three of the samples shall be oriented so that the thermal barrier is facing the light source.

9.4.10.3.3 Specimens shall be removed from the test apparatus and conditioned in a dark environment at a temperature of $21^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ($70^{\circ}\text{F} \pm 5^{\circ}\text{F}$), and a relative humidity of 65 percent ± 5 percent, for at least 4 hours prior to testing.

9.4.10.4 Specimen Preparation.

9.4.10.4.1 The moisture barrier material layer shall be removed from the conditioned sample composite and cut into specimens measuring at least 150 mm (6 in.) square.

9.4.10.4.2 A minimum of six specimens shall be tested. Three specimens shall be cut from the samples where the outer shell was facing the light source and three specimens shall be cut from the samples where the thermal barrier was facing the light source.

9.4.10.5 Procedure.

9.4.10.5.5 Specimens shall be tested in accordance with ASTM D751, *Standard Methods for Testing Coated Fabrics*, Hydrostatic Resistance, Procedure B – Rising Column Water Method, Procedure 2, Sections 46–49, with the following modifications:

- (1) An alternative test apparatus shall be permitted provided the exposed area of the specimen is at least 108 mm (4 1/4 in.) in diameter and the pressure can be applied uniformly over the exposure period at a precision of ± 0.1 kPa (± 0.2 psi).
- (2) The applied pressure shall be 13.8 kPa (2 psi) for an exposure period of 1 minute.
- (3) Restraining materials shall not be used.
- (4) The performance of the specimen shall be discerned by a person with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 305 mm (12 in.) with standard room illumination.

9.4.10.5.5.1 The moisture barrier specimen shall be placed in the apparatus with the film side facing away from the water source.

9.4.10.6 Report. The pass or fail performance for each specimen shall be recorded and reported.

9.4.10.7 Interpretation.

9.4.10.7.1 Evidence of water on the surface of the specimen during the exposure period shall constitute failing performance.

9.4.10.7.2 One or more test failures of any specimen shall constitute failure of material.

Substantiation: The light degradation resistance requirement and test method were removed during the first revision of the proposed 2024 edition of NFPA 1970 in response to Public Input 294 because the committee found the UV light exposure as applied in the test method was considered to be excessive compared to the exposure that would occur under field conditions. In the committee statement for the first revision where the requirement and test method were removed, it was noted that moisture barriers are not directly exposed to UV light since they are positioned underneath the outer shell material. It was further noted that outer shell materials are not subjected to this UV light exposure despite the known degradation of this layer by direct UV light exposure. Thus, the argument was made that any evaluation of the moisture barriers should

account for the manner in which UV light exposure occurs for the complete composite as individual layers are positioned. During the second revision of NFPA 1970, a separate evaluation for UV light degradation exposure to outer shell materials was added within the tear resistance test. However, the committee did not consider an updated test method for measurement for evaluating moisture barrier layers for resistance to degradation by UV light.

This TIA is being submitted to add a modified form of the light degradation test back into the standard for moisture barriers where the light exposure is performed as a standardized composite and is thus more representative of how the moisture barrier would be exposed during actual use. It is well known that some types of moisture barriers are more susceptible to degradation by UV exposure and therefore this requirement and test method is critical to ensuring the integrity of those moisture barriers is maintained after this known exposure.

Emergency Nature: The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

During the revision process, there was substantial work being done to remove certain harmful chemicals from the firefighter PPE, including moisture barriers, and it was believed at the time that the light degradation test was an unnecessary performance requirement that limited innovation and restricted the manufacturer's ability to place product on the market that could meet that criteria. However, since the revision process, there have now been three moisture barrier products developed that do meet the light degradation test as it was previously written, which is much more severe than what is being proposed in this TIA. This means that removing this test method in the NFPA 1970 moving forward is unnecessary and could open the door to products that cannot withstand a hazard that is known to exist which is UV light degradation of the moisture barriers.

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