Tentative Interim Amendment

NFPA 1994

Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents

2007 Edition

Reference: 7.1.2, 7.1.3, 7.1.4, 7.2.2, 7.2.3, 7.2.4, 8.7.4.1, 8.7.5, and 8.7.6
TIA 07-2
(SC 07-6-6/TIA Log #876)

Pursuant to Section 5 of the NFPA Regulations Governing Committee Projects, the National Fire Protection Association has issued the following Tentative Interim Amendment to NFPA 1994, *Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents,* 2007 edition. The TIA was processed by the Technical Committee on Hazardous Materials Protective Clothing and Equipment, and was issued by the Standards Council on June 4, 2007, with an effective date of June 24, 2007.

A Tentative Interim Amendment is tentative because it has not been processed through the entire standards-making procedures. It is interim because it is effective only between editions of the standard. A TIA automatically becomes a proposal of the proponent for the next edition of the standard; as such, it then is subject to all of the procedures of the standards-making process.

1. Make the following changes in Chapter 7 Performance Criteria:

7.1.2 Class 2 Garment Element Requirements.
7.1.2.1 Class 2 garment materials and seams shall be tested for permeation resistance as specified in Section 8.7, Chemical Permeation Resistance Test, and shall meet the following performance criteria:
(1) For permeation testing of chemical warfare agent Distilled Mustard (HD), the average cumulative permeation in 1 hour shall not exceed 4.0 μg/cm^2.
(2) For permeation testing of chemical warfare agent Soman (GD), the average cumulative permeation in 1 hour shall not exceed 1.25 μg/cm^2.
(3) For permeation testing of liquid and gaseous toxic industrial chemicals, ~~the average normalized breakthrough time shall be greater than 60 minutes~~ the average cumulative permeation in 1 hour shall not exceed 6.0 μg/cm^2.

7.1.2.8 Class 2 Garment Visor Element Requirements.
7.1.2.8.1 Class 2 garment visor materials and seams shall be tested for permeation resistance as specified in Section 8.7, Chemical Permeation Resistance Test, and shall meet the following performance criteria:
(1) For permeation testing of chemical warfare agent Distilled Mustard (HD), the average cumulative permeation in 1 hour shall not exceed 4.0 μg/cm^2.
(2) For permeation testing of chemical warfare agent Soman (GD), the average cumulative permeation in 1 hour shall not exceed 1.25 μg/cm^2.
(3) For permeation testing of liquid and gaseous toxic industrial chemicals, ~~the average normalized breakthrough time shall be greater than 60 minutes~~ the average cumulative permeation in 1 hour shall not exceed 6.0 μg/cm^2.

7.1.3 Class 2 Glove Element Requirements.
7.1.3.2 Class 2 glove materials and seams shall be tested for permeation resistance as specified in Section 8.7, Chemical Permeation Resistance Test, and shall meet the following performance criteria:

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(1) For permeation testing of chemical warfare agent Distilled Mustard (HD), the average cumulative permeation in 1 hour shall not exceed 4.0 μg/cm^2.
(2) For permeation testing of chemical warfare agent Soman (GD), the average cumulative permeation in 1 hour shall not exceed 1.25 μg/cm^2.
(3) For permeation testing of liquid and gaseous industrial chemicals, ~~the average normalized breakthrough time shall be greater than 60 minutes~~ the average cumulative permeation in 1 hour shall not exceed 6.0 μg/cm^2.

7.1.4 Class 2 Footwear Element Requirements.
7.1.4.2 Class 2 footwear materials and seams shall be tested for permeation resistance as specified in Section 8.7, Chemical Permeation Resistance Test, and shall meet the following performance criteria:
(1) For permeation testing of chemical warfare agent Distilled Mustard (HD), the average cumulative permeation in 1 hour shall not exceed 4.0 μg/cm^2.
(2) For permeation testing of chemical warfare agent Soman (GD), the average cumulative permeation in 1 hour shall not exceed 1.25 μg/cm^2.
(3) For permeation testing of liquid and gaseous industrial chemicals, ~~the average normalized breakthrough time shall be greater than 60 minutes~~ the average cumulative permeation in 1 hour shall not exceed 6.0 μg/cm^2.

7.2.2 Class 3 Garment Element Requirements.
7.2.2.1 Class 3 garment materials and seams shall be tested for permeation resistance as specified in Section 8.7, Chemical Permeation Resistance Test, and shall meet the following performance criteria:
(1) For permeation testing of chemical warfare agent Distilled Mustard (HD), the average cumulative permeation in 1 hour shall not exceed 4.0 μg/cm^2.
(2) For permeation testing of chemical warfare agent Soman (GD), the average cumulative permeation in 1 hour shall not exceed 1.25 μg/cm^2.
(3) For permeation testing of liquid and gaseous industrial chemicals, ~~the average normalized breakthrough time shall be greater than 60 minutes~~ the average cumulative permeation in 1 hour shall not exceed 6.0 μg/cm^2.

7.2.2.9 Class 3 Garment Visor Element Requirements.
7.2.2.9.1 Class 2 garment visor materials and seams shall be tested for permeation resistance as specified in Section 8.7, Chemical Permeation Resistance Test, and shall meet the following performance criteria:
(1) For permeation testing of chemical warfare agent Distilled Mustard (HD), the average cumulative permeation in 1 hour shall not exceed 4.0 μg/cm^2.
(2) For permeation testing of chemical warfare agent Soman (GD), the average cumulative permeation in 1 hour shall not exceed 1.25 μg/cm^2.
(3) For permeation testing of liquid and gaseous industrial chemicals, ~~the average normalized breakthrough time shall be greater than 60 minutes~~ the average cumulative permeation in 1 hour shall not exceed 6.0 μg/cm^2.

7.2.3 Class 3 Glove Element Requirements.
7.2.3.2 Class 3 glove materials and seams shall be tested for permeation resistance as specified in Section 8.7, Chemical Permeation Resistance Test, and shall meet the following performance criteria:
(1) For permeation testing of chemical warfare agent Distilled Mustard (HD), the average cumulative permeation in 1 hour shall not exceed 4.0 μg/cm^2.
(2) For permeation testing of chemical warfare agent Soman (GD), the average cumulative permeation in 1 hour shall not exceed 1.25 μg/cm^2.
(3) For permeation testing of liquid and gaseous industrial chemicals, ~~the average normalized breakthrough time shall be greater than 60 minutes~~ the average cumulative permeation in 1 hour shall not exceed 6.0 μg/cm^2.

7.2.4 Class 3 Footwear Element Requirements.
7.2.4.2 Class 3 footwear materials and seams shall be tested for permeation resistance as specified in Section 8.7, Chemical Permeation Resistance Test, and shall meet the following performance criteria:
(1) For permeation testing of chemical warfare agent Distilled Mustard (HD), the average cumulative permeation in 1 hour shall not exceed 4.0 μg/cm^2.
(2) For permeation testing of chemical warfare agent Soman (GD), the average cumulative permeation in 1 hour shall not exceed 1.25 μg/cm^2.
(3) For permeation testing of liquid and gaseous industrial chemicals, ~~the average normalized breakthrough time shall be greater than 60 minutes~~ the average cumulative permeation in 1 hour shall not exceed 6.0 μg/cm^2.

2. Modify permeation test procedures for measurement of cumulative permeation for liquid and gaseous toxic industrial chemicals as follows:

8.7.4.1 Specimens shall be tested for permeation resistance for ~~not less than~~ 60 minutes, +1 minute, -0 minute against the chemicals specified in 8.7.4.2 and 8.7.4.3 in accordance with ASTM F 739, *Standard Test Method for Resistance of*

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Protective Clothing Materials to Permeation by Liquids or Gases Under Conditions of Continuous Contact, with the following modifications:
(1) The test cells shall be designed to accommodate the introduction of liquid chemicals in a safe manner.
(2) The testing mode shall be open loop and the collection media shall be filtered air at a temperature of 32°C ±3°C (90°F ±5°F) and a relative humidity of 80 percent ±5 percent, flowed through the collection chamber of the test cell at a rate of 1 Lpm ±0.1 Lpm.
~~(3) Analytical methods used shall be sensitive to concentrations of at least one order of magnitude lower than the required end points.~~
~~(4) Where cumulative permeation end points are not specified in this standard, a permeation rate of 0.1 µg/cm^2/min, as defined by ASTM F 739, *Standard Test Method for Resistance of Protective Clothing Materials to Permeation by Liquids or Gases Under Conditions of Continuous Contact*, shall be used.~~
(3)* A means shall be used to determine the total amount of permeating chemical over a 60-minute period following initial contact of the material with the challenge chemical.
(4) The cumulative permeation in micrograms per square centimeter at 60 minutes, +1 minute, -0 minute of chemical exposure shall be determined.
(5) The selected method of detection shall have a sensitivity that is at least one order of magnitude less than the specified end point for the respective chemical over the 60-minute test period. The actual sensitivity of the selected method of detection shall be determined.

8.7.5 Report.
8.7.5.1 For permeation testing of chemical warfare agents specified in 8.7.4.2(1) and liquid and gaseous industrial chemicals specified in 8.7.4.2(2) and 8.7.4.3**,** the cumulative permeation in 1 hour shall be recorded and reported in µg/cm^2 for each specimen. The average cumulative permeation in 1 hour for all specimens shall be calculated, recorded, and reported. The report shall include the pass or fail results for each chemical tested.
~~**8.7.5.2** For permeation testing of liquid and gaseous industrial chemicals specified in 8.7.4.2(2) and 8.7.4.3, the normalized breakthrough time shall be recorded and reported in minutes for each specimen. The average normalized breakthrough time shall also be calculated and reported.~~
8.7.5.2 If no challenge chemical is detected at the end of the 60-minute test period, the cumulative permeation shall be reported as less than the minimum detectable mass per unit area for the specific chemical being tested.
8.7.5.3 The average cumulative permeation shall be calculated for all specimens.
8.7.5.3.1 If no challenge chemical is detected for one or two specimens, the average cumulative permeation shall be the average of all specimens where cumulative permeation is measured and the minimum detectable cumulative permeation for those specimens where no challenge chemical is detected.
8.7.5.3.2 If no challenge chemical is detected in all of the specimens tested, the average cumulative permeation shall be reported as less than the minimum detectable mass per unit area for the specific chemical being tested.

8.7.6 Interpretation.
~~**8.7.6.1**~~ For permeation testing of chemical warfare agents specified in 8.7.4.2(1) and liquid and gaseous industrial chemicals specified in 8.7.4.2(2) and 8.7.4.3, the average cumulative permeation shall be used to determine pass or fail performance.
~~**8.7.6.2*** For permeation testing of liquid and gaseous industrial chemicals specified in 8.7.4.2(2) and 8.7.4.3, the average normalized breakthrough time shall be used to determine pass or fail performance.~~

3. Delete the following paragraph of Annex A that is no longer applicable for permeation testing:

~~**A.8.7.6.2** In ASTM F 739, *Standard Test Method for Resistance of Protective Clothing Materials to Permeation by Liquids or Gases Under Conditions of Continuous Contact*, normalized breakthrough time is the time at which permeation of the challenge chemical through the specimen exceeds 0.1 µg/cm^2/min. If the permeation rate does not exceed this 0.1 µg/cm^2/min, the normalized breakthrough time is reported as greater than the test duration, or, in this case, >60 minutes. However, this does not mean that breakthrough did not occur. If the permeation rate remained slightly under 0.1 µg/cm^2/min for the 60-minute duration of this procedure, a level of 6 µg/cm^2/min of chemical would have permeated.~~

4. Add new paragraph to Annex A, as follows:

A.8.7.4.1(3) One method of determining the total amount of permeating chemical is to flow the conditioned collection medium through an appropriate filter or sorbent that captures the chemical. Following the 60-minute exposure period of the protective clothing material specimen (for each challenge chemical)**,** the filter or sorbent can then be removed, and the collected challenge chemical extracted for analysis using an extract chemical and analytical technique that is specific to the challenge chemical.

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