

NFPA®

1990

Standard for
Protective Ensembles for
Hazardous Materials and
CBRN Operations

2022

Includes

NFPA 1991 | NFPA 1992 | NFPA 1994



NFPA® 1990

Standard for Protective Ensembles for Hazardous Materials and CBRN Operations

2022 Edition



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NFPA® 1990

Standard for

Protective Ensembles for Hazardous Materials and CBRN Operations

2022 Edition

This edition of NFPA 1990, *Standard for Protective Ensembles for Hazardous Materials and CBRN Operations*, was prepared by the Technical Committees on Hazardous Materials Protective Clothing and Equipment and Emergency Medical Services Protective Clothing and Equipment and released by the Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment. It was issued by the Standards Council on July 4, 2021, with an effective date of July 24, 2021.

This edition of NFPA 1990 was approved as an American National Standard on July 24, 2021.

Origin and Development of NFPA 1990

NFPA 1990, which is a consolidation of NFPA 1991, NFPA 1992, and NFPA 1994, provides users, manufacturers, test laboratories, and certification authorities with one source of information for the product performance requirements for Hazmat/CBRN ensembles and ensemble elements.

In 1985, the National Transportation Safety Board (NTSB) issued Report I-004-5 on a hazardous materials incident that occurred in Benicia, CA. In that report, the NTSB recommended that standards be developed for hazardous materials protective clothing. The United States Department of Transportation (DOT) issued a position requesting that private sector standards be written on hazardous chemical protective clothing, specifically by NFPA. DOT asked other governmental agencies to assist and participate in the private sector standards development system.

The Environmental Protection Agency, United States Coast Guard (USCG), Federal Emergency Management Agency (FEMA), and Occupational Safety and Health Administration (OSHA) either adopted position statements modeled after the DOT position or endorsed the DOT position. The NFPA Standards Council approved a project for the development of those standards and assigned the project to the Technical Committee on Fire Service Protective Clothing and Equipment. The Technical Committee then established a Subcommittee on Hazardous Materials Chemical Protective Clothing, which began work in March 1986 with representatives from USCG, FEMA, and OSHA participating.

This resulted in the first editions of NFPA 1991, NFPA 1992, and NFPA 1993 being published with an effective date of February 5, 1990. NFPA 1993, intended for hazardous materials support functions, was discontinued in 2000, as many of its requirements were incorporated into NFPA 1992.

The first edition of NFPA 1994 was released in August 2001 to answer the need for personal protective equipment for fire and emergency services personnel operating at domestic terrorism incidents involving dual-use industrial chemicals, chemical terrorism agents, or biological terrorism agents. NFPA 1994 was the first standard in the set to introduce levels of protection to reduce the safety and health risks to personnel during assessment, extrication, rescue, triage, and treatment operations.

Due to the distinct similarities in the user communities of these documents, they became part of the first round of the Emergency Response and Responder Safety document consolidation project as approved by the NFPA Standards Council.

Between 2012 and 2020, a tremendous effort was made by the Technical Committee to evaluate every test method, including its implementation, application, and endpoints, to ensure that they were operationally relevant to the user community and could be reproduced. This process incorporated interlaboratory and intra-laboratory validation efforts and allowed for the seamless merger of NFPA 1991, NFPA 1992, and NFPA 1994 into the new NFPA 1990 product.

This first edition of NFPA 1990 fully consolidates the three remaining chemical protective clothing standards under one title but retains their autonomy for the purposes of certification and

use. While the individual standards are fully integrated within NFPA 1990, it is still possible to certify a product against any of the individual standards.

Principal Changes

NFPA 1991, 1990 edition:

- First edition addressed vapor-protective ensembles.
- Challenged the primary suit materials used for protection against chemical permeation following ASTM F1001, *Standard Guide for Selection of Chemicals to Evaluate Protective Clothing Materials*, which detailed the classes of chemicals encountered during hazardous materials emergencies.
- Developed performance requirements to reflect simulated use conditions.
- Included ensemble-level tests for airtight integrity and water penetration.
- Incorporated material testing for burst strength, tear strength, abrasion resistance, flammability resistance, cold temperature performance, and flexural fatigue to ensure ensemble materials could afford adequate protection in the operational environment.

NFPA 1992, 1990 edition:

- First edition addressed liquid splash-protective ensembles.
- Challenged primary suit materials for protection against chemical penetration following ASTM F1001, which detailed the liquids that were not toxic to the skin nor contained suspected carcinogens.
- Developed performance requirements to reflect simulated use conditions.
- Introduced ensemble-level test for water penetration.
- Incorporated material testing for burst strength, tear strength, abrasion resistance, flammability resistance, cold temperature performance, and flexural fatigue to ensure ensemble materials could afford adequate protection in the operational environment.

NFPA 1993, 1990 edition:

- First edition addressed liquid splash ensembles specific to support functions outside the hot zone, such as decontamination, remedial cleanup, or training in controlled and known environments.
- Included many of the same requirements as NFPA 1992, with the exceptions that no flame resistance requirement was applied to primary materials and lower physical property criteria were established for ensemble materials.

NFPA 1991, 1994 edition:

- Expanded chemical battery characteristics to include four additional gases.
- Expanded gastight integrity requirement to every suit.
- Introduced new test for maximum suit pressure and ventilation.
- Added design and performance criteria for visors, gloves, and footwear.
- Added optional flash fire and liquified gas requirements.
- Introduced concept of replaceable gloves and footwear.

NFPA 1992, 1994 edition:

- Established design and performance criteria for gloves and footwear.
- Added concept of replaceable gloves and footwear.

NFPA 1991, 2000 edition:

- Introduced CBRN option with establishment of inward leakage test and use of cumulative permeation for chemical warfare agent permeation.
- Changed glove and footwear physical property requirements significantly.

NFPA 1992, 2000 edition:

- Opened to include individual ensemble elements (garments, gloves, and footwear) and both encapsulating and non-encapsulating ensembles.
- Changed chemical battery characteristics to use vapor pressure as an additional criterion for determining suitability of test chemicals.
- Removed mandatory flame resistance requirement but retained optional flash fire requirement.
- Reduced seam testing to two chemicals.
- Changed glove and footwear physical property testing significantly.

NFPA 1993, 2000 edition:

- Standard withdrawn, as NFPA 1992 scope was changed to address performance needs covered in NFPA 1993.

NFPA 1994, 2001 edition:

- First edition.
- Established three classes of protection with Class 1 (highest), Class 2 (intermediate), and Class 3 (lowest).
- Set different levels of integrity and material performance for each class consistent with the intended application of the ensemble.

NFPA 1991, 2005 edition:

- Made CBRN requirement mandatory.

NFPA 1992, 2005 edition:

- Minorly changed some test methods and performance criteria.

NFPA 1994, 2007 edition:

- Dropped original Class 1 concept (became part of NFPA 1991).
- Revised ensemble Classes 2 and 3 requirements for use with SCBA and APR/powered air-purifying respirators, respectively.
- Added new Class 4 for particulate hazards with introduction of new whole-suit particulate test.
- Replaced Man-In-Simulant Test (MIST) SF6 as inward leakage test for Class 2 and 3 ensembles.
- Modified chemical battery and chemical warfare agent requirements.

NFPA 1992, 2012 edition:

- Changed chemical battery test.
- Added new footwear slip resistance requirement.
- Introduced optional total heat loss reporting requirement.

NFPA 1994, 2012 edition:

- Made improvements to the MIST evaluation test method.
- Changed permeation testing to cumulative permeation.
- Added new footwear slip resistance requirement.
- Added design requirements to ensure that the ensemble would not invalidate respirator certification.

NFPA 1991, 2016 edition:

- Changed title to include CBRN terrorism incidents.
- Added mandatory requirement for encapsulation of the wearer and their breathing apparatus.
- No longer permitted overcovers and detachable visors for achieving certification of base ensemble criteria (must be permanently attached).
- Prohibited tape from being used to secure or seam components of the ensemble.
- Required protective covers to protect the suit closure.
- Replaced vapor inward leakage test with MIST performed at higher concentration.
- Replaced acrolein and acrylonitrile with cyanogen chloride, hydrogen cyanide, and phosgene as more relevant skin-toxic chemicals.
- Replaced soman (GD) with sarin (GB).
- Replaced impact resistance with burst and puncture/tear testing of visor materials.
- Added field of vision assessment and timed hand insertion/reinsertion into gloves.
- Required ensemble shelf life to be reported.
- Made incremental improvements for test method repeatability and interpretation.

NFPA 1992, 2018 edition:

- Significantly changed in scope whereby it stated that NFPA 1992 protective clothing and ensembles could then be used with known or suspected carcinogens and established the standard as applying to any chemicals that are not gas or vapor-producing liquids at concentrations known to be toxic to the skin.
- Updated chemical challenges to include more operationally relevant chemicals, such as sodium hydroxide and sodium hypochlorite, as well as chemicals known to degrade materials, such as dimethylformamide and tetrachloroethylene.
- Broadened footwear options to allow for more choices.
- Added evaporative resistance as an optional test for reporting the breathability of ensemble garment materials.
- Updated tests to more closely align with operational use and added tests for field of vision or glove-hand insertion/reinsertion.
- Added criteria to address separate hoods and elastomeric materials.
- Made incremental improvements to test methods for repeatability and interpretation.

NFPA 1994, 2018 edition:

- Changed title and scope to match application for both hazardous materials emergencies and CBRN incidents to minimize confusion as to the applicability of the standard for non-terrorism incidents.
- Re-established Class 1 requirements to provide criteria parallel to those in NFPA 1991 and provided practical criteria for barrier performance and overall design for a more form-fitting and tactical product.
- Added ruggedized categories of certification (type R) to Classes 2, 3, and 4 to address the increasing use of the garments in harsher environments, such as those in urban search and rescue and law enforcement applications.
- Updated chemical challenges to represent the vast diversity of chemicals found in the global chemical industry and to cover the breadth of fundamental chemical reactivity principles.
- Addressed material breathability as measured by evaporative resistance and total heat loss by reporting results in Class 2 and Class 2R ensembles and applying specific requirements for Class 3/3R and Class 4/4R ensembles.
- Broadened footwear options to allow for more flexibility when a chemical protective sock is used in coordination with a boot.
- Added criteria to address separate hoods and elastomeric materials.
- Introduced incremental improvements for test methods for repeatability and interpretation.
- Added optional criteria for flash fire protection for all ensemble levels with a minimum level of flame resistance established in Class 1 ensembles.
- Established optional criteria for stealth, including audible signatures and color, to address tactical concerns.

NFPA 1990, 2021 edition:

- First edition of NFPA 1990, which consolidates NFPA 1991, NFPA 1992, and NFPA 1994.
- The scopes of the three standards have been combined and a reference to the new NFPA 1891, *Standard on Selection, Care, and Maintenance of Hazardous Materials Clothing and Equipment*, which was developed in parallel, has been added.
- An updated and uniform set of definitions has been added to provided consistency in terminology throughout the consolidated standard.
- Specific efforts have been made to streamline certification, labeling, design, and performance requirements using a table format to allow for comparisons and efficient referencing relative to each type and class of ensemble.
- Different footwear design and performance criteria are separated to address separate requirements for ensemble socks, full boots, and outer boots.
- A new test for flame break open resistance has been put together based on a government-sponsored study demonstrating the need to address materials that can potentially be compromised by prolonged exposure to flame and radiant heat sources.
- The optional overall ensemble flash fire test has been updated to use a more consistent test platform based on an ASTM test method with changes to the criteria reflecting first responder protection needs. An additional optional test has been added to measure percent body burn if chosen by the manufacturer.
- NFPA 1994 Class 5 ensembles have been added to provide protection for non-skin-toxic chemical threats with flammability hazards building upon NFPA 1951, *Standard on Protective Ensembles for Technical Rescue Incidents*, for its base requirements to allow for ease of dual certification.
- All test methods have been combined into one chapter and modified to address each of the individual standards as needed.
- A new low vapor agent permeation test has been added to address the evaluation of sulfuric acid against Class 1 materials.
- Liquid chemical runoff testing has been established based on an ISO test method for evaluation of Class 5 materials.
- Updated, consolidated annex information is included that shows the relationship of the different ensemble types and classes to OSHA 1910.120, *Hazardous waste operations and emergency response*, ensemble protection levels.

For more information about the ERRS consolidation project see nfpa.org/errs.

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This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on protective clothing and protective equipment, except respiratory protective equipment, that provides hand, foot, torso, limb, and head protection for fire fighters and other emergency services responders during incidents that involve hazardous materials operations. These operations involve the activities of rescue; hazardous material confinement, containment, and mitigation; and property conservation where exposure to substances that present an unusual danger to responders are present or could occur due to toxicity, chemical reactivity,

decomposition, corrosiveness, or similar reactions. Additionally, this Committee shall have primary responsibility for documents on the selection, care, and maintenance of hazardous materials protective clothing and protective equipment by fire and emergency services organizations and personnel.

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NFPA 1990

Standard for

**Protective Ensembles for Hazardous Materials
and CBRN Operations**

2022 Edition

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced and extracted publications can be found in Chapter 2 and Annex B.

Chapter 1 Administration

1.1* Scope. This standard shall specify the minimum design, performance, testing, documentation, and certification requirements for the following PPE, which is used by emergency responders during hazardous materials emergencies and CBRN terrorism incidents:

- (1) Vapor-protective ensembles and ensemble elements for hazardous materials emergencies and CBRN terrorism incidents
- (2) Liquid splash-protective ensembles and ensemble elements for hazardous materials emergencies
- (3) Hazmat/CBRN protective ensembles and ensemble elements for hazardous materials emergencies and CBRN terrorism incidents

1.1.1 This standard shall specify requirements for new ensembles and new ensemble elements.

1.1.2* This standard shall also specify additional optional criteria for ensembles that provide escape from chemical flash

fires encountered during hazardous materials emergencies and CBRN terrorism incidents.

1.1.3* This standard shall also establish requirements for ruggedized hazmat/CBRN protective ensembles or ensemble elements that provide a greater level of physical hazard resistance and increased durability and offer the potential for reuse.

1.1.4 This standard shall also establish additional optional requirements for hazmat/CBRN protective ensembles addressing stealth characteristics.

1.1.5* This standard alone shall not specify requirements for protective clothing for any firefighting applications or protective clothing for protection against ionizing radiation, cryogenic liquid hazards, or explosive atmospheres.

1.1.6* This standard shall not establish requirements for respiratory protection other than the type of respiratory protection that is specified for testing and certification of specific ensembles.

1.1.7 Certification of ensembles and ensemble elements to the requirements of this standard shall not preclude certification to additional appropriate standards where the ensemble or ensemble elements meet all the applicable requirements of each standard.

1.1.8 This standard shall not apply to any accessories that could be attached to a certified product, before or after purchase, that are not necessary for the certified product to meet the requirements of this standard.

1.1.9 This standard shall not be construed as addressing all the safety concerns associated with the use of compliant vapor-protective ensembles and ensemble elements, liquid splash-protective ensembles and ensemble elements, and hazmat/CBRN protective ensembles and ensemble elements. It shall be the responsibility of the persons and organizations that use compliant vapor-protective ensembles and ensemble elements, liquid splash-protective ensembles and ensemble elements, and hazmat/CBRN protective ensembles and ensemble elements to establish safety and health practices and to determine the applicability of regulatory limitations prior to use.

1.1.10 This standard shall not be construed as addressing all the safety concerns, if any, associated with the use of this standard by testing facilities. It shall be the responsibility of the persons and organizations that use this standard to conduct testing of compliant vapor-protective ensembles and ensemble elements, liquid splash-protective ensembles and ensemble elements, and hazmat/CBRN protective ensembles and ensemble elements to establish safety and health practices and to determine the applicability of regulatory limitations prior to using this standard to design, manufacture, or test ensembles.

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

1.2 Purpose.

1.2.1* The purpose of this standard shall be to establish a minimum level of protection for emergency responders during hazardous materials emergencies and CBRN terrorism incidents.

1.2.1.1 The purpose of this standard shall be to establish a minimum level of liquified gas protection as an option for compliant vapor-protective ensembles and compliant ensemble elements.

1.2.1.2 The purpose of this standard shall be to establish a minimum level of limited chemical flash fire protection for escape in the event of a chemical flash fire as an option for compliant vapor-protective ensembles, compliant liquid splash-protective ensembles, and compliant hazmat/CBRN protective ensembles.

1.2.1.3 The purpose of these options shall be to provide emergency response organizations the flexibility to specify these options in their purchase specifications according to the anticipated exposure and expected needs of the emergency response organization.

1.2.2 The purpose of the hazmat/CBRN protective ensemble and ensemble element requirements shall be to establish five levels of hazmat/CBRN protective ensembles and ensemble elements that provide minimum protection of emergency first responder personnel based on what the incident risk analysis indicates is necessary protection for the intended operations.

1.2.2.1 The standard shall establish a level of physical hazard resistance for the ruggedized classes of hazmat/CBRN ensembles and ensemble elements that shall be used for operations requiring ensembles and ensemble elements with increased durability.

1.2.2.2 The purpose of this standard shall be to establish a minimum level of stealth characteristics as an option for compliant hazmat/CBRN ensembles.

1.2.3 Controlled laboratory tests used to determine compliance with the performance requirements of this standard shall not be deemed to be establishing performance levels for all situations to which personnel can be exposed.

1.2.4 This standard is not intended to be utilized for detailed manufacturing or purchase specification, but it shall be permitted to be referenced in purchase specifications as a minimum requirement.

1.3* Application.

1.3.1* This standard shall apply to the design, manufacturing, testing, documentation, and certification of new vapor-protective ensembles and ensemble elements, new liquid splash-protective ensembles and ensemble elements, and new hazmat/CBRN ensembles and ensemble elements and shall be applied as follows:

- (1) Chapters 1 through 3, Sections 4.1 and 4.2, Sections 5.1 and 5.2, Sections 6.1 and 6.2, Sections 7.1 and 7.2, Chapter 8, and all related paragraphs of Annex A constitute the 2022 edition of NFPA 1991.
- (2) Chapters 1 through 3, Sections 4.1 and 4.3, Section 5.1, Section 5.3, Section 6.1, Section 6.3, Section 7.1, Section 7.3, Chapter 8, and all related paragraphs of Annex A constitute the 2022 edition of NFPA 1992.
- (3) Chapters 1 through 3, Sections 4.1 and 4.4, Section 5.1, Section 5.4, Section 6.1, Section 6.4, Section 7.1, Section 7.4, Chapter 8, and all related paragraphs of Annex A constitute the 2022 edition of NFPA 1994.

1.3.1.1* The requirements for Class 1 hazmat/CBRN protective ensembles and ensemble elements shall apply to ensembles

designed to provide protection to emergency responders at incidents involving vapor or liquid chemical hazards where the concentrations are at or above immediately dangerous to life and health (IDLH) levels, thus requiring the use of SCBA equipment.

1.3.1.2 The requirements for Class 2 hazmat/CBRN protective ensembles and ensemble elements shall apply to ensembles designed to provide limited protection to emergency responders at hazardous materials emergencies or CBRN terrorism incidents involving vapor or liquid chemical hazards where the concentrations are at or above IDLH levels, thus requiring the use of SCBA equipment.

1.3.1.3 The requirements for Class 3 hazmat/CBRN protective ensembles and ensemble elements shall apply to ensembles designed to provide limited protection to emergency responders at hazardous materials emergencies or CBRN terrorism incidents involving low levels of vapor or liquid chemical hazards, where the concentrations are below IDLH levels, thus permitting the use of air-purifying respirators (APR).

1.3.1.4 The requirements for Class 4 hazmat/CBRN protective ensembles and ensemble elements shall apply to ensembles designed to provide limited protection to emergency responders at CBRN terrorism incidents involving particulate hazards, including biological hazards or radiological particulate hazards, where the concentrations are below IDLH levels, thus permitting the use of APR equipment.

1.3.1.5 The requirements for Class 5 hazmat/CBRN protective ensembles and ensemble elements shall apply to ensembles designed to provide limited protection to emergency responders at CBRN terrorism incidents involving flammable gases not toxic to the skin where the potential exists for chemical flash fires, further requiring the use of SCBA equipment.

1.3.1.6 This edition of NFPA 1990 shall not apply to vapor-protective ensembles and ensemble elements, liquid splash-protective ensembles and ensemble elements, and hazmat/CBRN ensembles and ensemble elements manufactured for compliance with previous editions of NFPA 1991, NFPA 1992, or NFPA 1994.

1.3.2 This standard alone shall not apply to protective clothing for protection against ionizing radiation, cryogenic liquid hazards, or explosive atmospheres.

1.3.3 This standard alone shall not apply to liquid splash-protective ensembles and ensemble elements where a hazardous material is present as a gas or a vapor-producing liquid at vapor concentrations known to be toxic to the skin.

1.3.4 This standard alone shall not apply to protective clothing for any firefighting applications.

1.3.5* This standard shall not apply to the respiratory protection necessary for proper protection of the ensemble.

1.3.6* Requirements of this standard shall not apply to the use of closed-circuit SCBA.

1.3.7* This standard shall not apply to the use requirements for vapor-protective ensembles and ensemble elements, liquid splash-protective ensembles and ensemble elements, and hazmat/CBRN ensembles and ensemble elements; these requirements are specified in NFPA 1500 and NFPA 1891.

1.3.8* This standard shall not apply to the selection, reuse, care, and maintenance of vapor-protective ensembles or ensemble elements, liquid splash-protective ensembles or ensemble elements, or protective ensembles and ensemble elements for hazardous materials emergencies and CBRN terrorism incidents, as these requirements are specified in NFPA 1891.

1.3.9* The requirements of this standard shall not apply to any accessories that could be attached to the product but are not necessary for the product to meet the requirements of this standard.

1.4 Units.

1.4.1 In this standard, SI units shall be followed by an equivalent in U.S. units in parentheses.

1.4.2 The values in SI units shall be regarded as the requirement.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, 2022 edition.

NFPA 1500™, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*, 2021 edition.

NFPA 1891, *Standard on Selection, Care, and Maintenance of Hazardous Materials Clothing and Equipment*, 2022 edition.

NFPA 1951, *Standard on Protective Ensembles for Technical Rescue Incidents*, 2020 edition.

NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, 2018 edition.

NFPA 1977, *Standard on Protective Clothing and Equipment for Wildland Fire Fighting and Urban Interface Fire Fighting*, 2022 edition.

NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, 2019 edition.

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

NFPA 1991, *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies and CBRN Terrorism Incidents*, 2016 edition.

NFPA 1992, *Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies*, 2018 edition.

NFPA 1994, *Standard on Protective Ensembles for First Responders to Hazardous Materials Emergencies and CBRN Terrorism Incidents*, 2018 edition.

NFPA 1999, *Standard on Protective Clothing and Ensembles for Emergency Medical Operations*, 2018 edition.

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 Evaluation Procedure 6, *Instrumental Color Measurement*, 2016.

2.3.2 ANSI Publications. American National Standards Institute, Inc., 25 West 43rd Street, 4th floor, New York, NY 10036.

ANSI/ISEA Z87.1, *American National Standard for Occupational and Educational Personal Eye and Face Protection Devices*, 2020.

ANSI/ISEA Z89.1, *American National Standard for Industrial Head Protection*, 2014 (R2019).

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

ASTM D412, *Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers — Tension*, 2016.

ASTM D471, *Standard Test Method for Rubber Property — Effect of Liquids*, 2016a.

ASTM D747, *Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam*, 2010, withdrawn.

ASTM D751, *Standard Test Methods for Coated Fabrics*, 2019.

ASTM D1776/D1776M, *Standard Practice for Conditioning and Testing Textiles*, 2020.

ASTM D2136, *Standard Test Method for Coated Fabrics — Low-Temperature Bend Test*, 2019.

ASTM D2582, *Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting*, 2016.

ASTM D3884, *Standard Guide for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)*, 2009, reapproved 2017.

ASTM D4157, *Standard Test Method for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder Method)*, 2013, reapproved 2017.

ASTM D5151, *Standard Test Method for Detection of Holes in Medical Gloves*, 2019.

ASTM D6413/D6413M, *Standard Test Method for Flame Resistance of Textiles (Vertical Test)*, 2015.

ASTM F392/F392M, *Standard Practice for Conditioning Flexible Barrier Materials for Flex Durability*, 2011, reapproved 2015.

ASTM F739, *Standard Test Method for Permeation of Liquids and Gases Through Protective Clothing Materials Under Conditions of Continuous Contact*, 2012e1.

ASTM F903, *Standard Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Liquids*, 2018.

ASTM F1001, *Standard Guide for Selection of Chemicals to Evaluate Protective Clothing Materials*, 2012, reaffirmed 2017.

ASTM F1052, *Standard Test Method for Pressure Testing Vapor Protective Suits*, 2014.

ASTM F1154, *Standard Practices for Evaluating the Comfort, Fit, Function, and Durability of Protective Ensembles, Ensemble Elements, and Other Components*, 2018.

ASTM F1301, *Standard Practice for Labeling Chemical Protective Clothing*, 2018.

ASTM F1342/F1342M, *Standard Test Method for Protective Clothing Material Resistance to Puncture*, 2005, reapproved 2013e1.

ASTM F1358, *Standard Test Method for Effects of Flame Impingement on Materials Used in Protective Clothing not Designated Primarily for Flame Resistance*, 2016.

ASTM F1359/F1359M, *Standard Test Method for Liquid Penetration Resistance of Protective Clothing or Protective Ensembles Under a Shower Spray While on a Manikin*, 2016a.

ASTM F1671, *Standard Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Blood-Borne Pathogens Using Phi-X174 Bacteriophage Penetration as a Test System*, 2013.

ASTM F1790, *Standard Test Method for Measuring Cut Resistance of Materials Used in Protective Clothing*, 2005.

ASTM F1868, *Standard Test Method for Thermal and Evaporative Resistance of Clothing Materials Using a Sweating Hot Plate*, 2017.

ASTM F1930, *Standard Test Method for Evaluation of Flame-Resistant Clothing for Protection Against Fire Simulations Using an Instrumented Manikin*, 2018.

ASTM F2010/F2010M, *Standard Test Method for Evaluation of Glove Effects on Wearer Finger Dexterity Using a Modified Pegboard Test*, 2018.

ASTM F2412, *Standard Test Methods for Foot Protection*, 2018a.

ASTM F2413, *Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear*, 2018.

ASTM F2700, *Standard Test Method for Unsteady-State Heat Transfer Evaluation of Flame Resistant Materials for Clothing with Continuous Heating*, 2008, reapproved 2013.

ASTM F2913, *Standard Test Method for Measuring the Coefficient of Friction for Evaluation of Slip Performance of Footwear and Test Surfaces/Flooring Using a Whole Shoe Tester*, 2019.

2.3.4 FIA Publications. Footwear Industries of America, 1420 K Street, NW, Suite 600, Washington, DC 20005.

FIA Standard 1209, *Whole Shoe Flex*, 1984.

2.3.5 IEC Publications. International Electrotechnical Commission, 3, rue de Varembé, P.O. Box 131, CH-1211 Geneva 20, Switzerland.

IEC 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications*, 2013.

2.3.6 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, confirmed 2014.

ISO 4649, *Rubber, vulcanized or thermoplastic — Determination of abrasion resistance using a rotating cylindrical drum device*, 2017.

ISO 6530, *Protective clothing — Protection against liquid chemicals — Test method for resistance of materials to penetration by liquids*, 2005.

ISO 9001, *Quality management systems — Requirements*, 2015.

ISO 11092, *Textiles — Physiological effects — Measurement of thermal and water-vapour resistance under steady-state conditions (sweating guarded-hotplate test)*, 2014.

ISO/IEC 17011, *Conformity assessment — Requirements for accreditation bodies accrediting conformity assessment bodies*, 2004.

ISO/IEC 17021, *Conformity assessment — Requirements for bodies providing audit and certification of management systems*, 2015.

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.

2.3.7 NIOSH Publications. National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, 1600 Clifton Road, Atlanta, GA 30329-4027.

Statement of Standard for NIOSH CBRN APR Testing, 2003.

Statement of Standard for NIOSH CBRN PAPR Testing, 2006.

Statement of Standard for NIOSH CBRN SCBA Testing, 2003.

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

Federal Test Method Standard 191A, *Textile Test Methods*, 1978.

Title 18, United States Code, Part 2332a, “Use of Weapons of Mass Destruction.”

Title 29, Code of Federal Regulations, Part 1910.132, “Personal Protective Equipment: General Requirements.”

2.3.9 Other Publications.

Merriam-Webster’s Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

Technical Assessment of the Man-In-Simulant Test Program, National Research Council Report, The National Academies, 500 Fifth St. NW, Washington, DC 20001, 1997.

The Technical Cooperation Program, Chemical Biological Defense Technical Panel 11 on Low Burden, Integrated Protective Clothing, “Final Report: Development of a Standard Vapour Systems Test to Assess the Protection Capability of NBC Individual Protective Ensembles,” Appendix G, Defence Research Establishment Suffield Report, Biological and Chemical Defence Review Committee, Suite 405 2-2026, Lanthier Drive, Ottawa, ON, K4N 0N6, April 1997, UNCLASSIFIED.

2.3.10 US Military Publications. US Army Developmental Test Command (DTC), Technology Management Division (CSTE-DTC-TT-M), 314 Longs Corner Road, Aberdeen Proving Ground, MD 21005-5055.

Test Operations Procedure (TOP) 08-2-503, *Low Volatility Agent Permeation (LVAP) Swatch Testing*, 2018.

2.4 References for Extracts in Mandatory Sections. (Reserved)

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster’s Collegiate*

Dictionary, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.5 Shall. Indicates a mandatory requirement.

3.2.6 Should. Indicates a recommendation or that which is advised but not required.

3.2.7 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3* General Definitions.

3.3.1 Accessories. An item, or items, that are attached to the certified product that are not necessary to meet the requirements of the standard.

3.3.2 Afterflame. Persistent flaming of a material after the ignition source has been removed.

3.3.3 Afterflame Time. The length of time for which a material, component, or chemical-protective garment continues to burn after the simulated chemical flash fire has ended.

3.3.4 Agents.

3.3.4.1 Biological Terrorism Agents. Liquid or particulate agents that can consist of a biologically derived toxin or pathogen used to inflict lethal or incapacitating casualties,

generally on a civilian population as a result of a terrorist attack.

3.3.4.2 CBRN Terrorism Agents. The term used to refer to chemical terrorism agents, including chemical warfare agents and toxic industrial chemicals, biological terrorism agents, and radiological particulate terrorism agents. (See also 3.3.4.1, 3.3.4.3, and 3.3.4.5.)

3.3.4.3 Chemical Terrorism Agents. Liquid, solid, gaseous, and vapor chemical warfare agents and toxic industrial chemicals used to inflict lethal or incapacitating casualties, generally on a civilian population as a result of a terrorist attack.

3.3.4.4* Chemical Warfare (CW) Agents. Liquid, solid, and gas chemical agents (most are liquid) traditionally used during warfare or armed conflict to kill or incapacitate an enemy. (See also 3.3.4.3 and 3.3.4.6.)

3.3.4.5* Radiological Particulate Terrorism Agents. Particles that emit ionizing radiation in excess of normal background levels used to inflict lethal or incapacitating casualties, generally on a civilian population as the result of a terrorist attack.

3.3.4.6 Toxic Industrial Chemicals. Highly toxic solid, liquid, or gaseous chemicals that have been identified as mass casualty threats that could be used as weapons of terrorism to inflict casualties, generally on a civilian population during a terrorist attack. (See also 3.3.4.3 and 3.3.4.4.)

3.3.5 Assembly. The portion of the manufacturing process including, but not limited to, sewing, gluing, laminating, tacking, or other means of attaching whereby materials or component parts are put together to form a portion of the compliant product, or the complete compliant product.

3.3.6 Barrier Layer. The layer of garment material, glove material, footwear material, or hood material designated as primarily contributing to element integrity and chemical/barrier performance.

3.3.7 Boot. See 3.3.35.

3.3.8 Care. Procedures for cleaning, decontamination, and storage of protective clothing and equipment.

3.3.9 CBRN. Chemical, biological, radiological, and nuclear.

3.3.10 CBRN Terrorism Incidents. Situations involving the intentional or accidental release of CBRN warfare agents in civilian areas.

3.3.11 Certification/Certified. A system whereby a certification organization determines that a manufacturer has demonstrated the ability to produce a product that complies with the requirements of this standard, authorizes the manufacturer to use a label on listed products that comply with the requirements of this standard, and establishes a follow-up program conducted by the certification organization as a check on the methods the manufacturer uses to determine continued compliance of labeled and listed products with the requirements of this standard.

3.3.12* Certification Organization. An independent, third-party organization that determines product compliance with the requirements of this standard with a labeling/listing/follow-up program.

3.3.13* Chemical Flash Fire. The ignition of a flammable and ignitable vapor or gas that produces an outward expanding flame front as those vapors or gases burn. This burning and expanding flame front, a fireball, will release both thermal and kinetic energy to the environment.

3.3.14* Chemical-Protection Layer. The material or composite used in an ensemble or clothing for the purpose of providing protection from chemical hazards.

3.3.15 Closure Assembly. The combination of the suit or garment closure and the seam attaching the suit or garment closure to the suit or garment, including any protective flap or cover.

3.3.16 Compliance/Compliant. Meeting or exceeding all applicable requirements of this standard.

3.3.17 Compliant Product. Product that is covered by this standard and has been certified as meeting all applicable requirements of this standard that pertain to the product.

3.3.18* Component(s). Any material, part, or subassembly used in the construction of the compliant product.

3.3.19 Component Part(s). Any material(s) or part(s) used in the construction of a vapor-protective ensemble or ensemble elements.

3.3.20 Composite. The layer or layers of materials or components.

3.3.21 Cryogenic Gas. See 3.3.42.1.

3.3.22* Cryogenic Liquid. A refrigerated liquefied gas having a boiling point below -90°C (-130°F) at atmospheric pressure.

3.3.23 Elastomer. A polymeric material that returns to its original length and shape after stretching.

3.3.24* Elastomeric Interface Material. An exposed elastomeric material, not otherwise used as a garment material, that provides an interface other than seams between components of the ensemble and ensemble elements and, if applicable, the interface between the respirator facepiece and the ensemble or ensemble elements.

3.3.25 Element(s). See 3.3.28, Ensemble Elements.

3.3.26* Emergency Responders. Personnel assigned to organizations that have the responsibility for responding to hazardous materials emergencies and CBRN terrorism incidents.

3.3.27 Encapsulating Ensemble. A type of ensemble that completely covers the wearer and the wearer's respirator.

3.3.28 Ensemble Elements. Individual items of compliant protective clothing and equipment designed to provide minimum protection of specific areas of the body from some, but not all, risks occurring during hazardous materials and CBRN emergency response.

3.3.29 Ensembles. Multiple ensemble elements that, when worn together, are designed to provide minimum full-body protection from some, but not all, risks occurring during hazardous materials emergencies and CBRN terrorism incidents. (See also 3.3.28, Ensemble Elements).

3.3.29.1 NFPA 1991-Certified Ensembles and Ensemble Elements.

3.3.29.1.1* Vapor-Protective Ensemble. Multiple elements of compliant protective clothing and equipment that, when worn together, provide protection from some, but not all, risks in vapor, liquid splash-protective, and particulate environments during hazardous materials emergencies and CBRN terrorism incidents in vapor, gas, liquid, or particulate forms.

3.3.29.1.2 Vapor-Protective Ensemble with Optional Chemical Flash Fire Escape and Liquefied Gas Protection. A compliant vapor-protective ensemble that is also certified as compliant with the optional requirements for both limited protection against chemical flash fire for escape only and for protection against liquefied gases.

3.3.29.1.3* Vapor-Protective Ensemble with Optional Chemical Flash Fire Escape Protection. A compliant vapor-protective ensemble that is also certified as compliant with the optional requirements for limited protection against chemical flash fire for escape only.

3.3.29.1.4* Vapor-Protective Ensemble with Optional Liquefied Gas Protection. A compliant vapor-protective ensemble that is also certified as compliant with the optional requirements for protection against liquefied gases.

3.3.29.1.5* Vapor-Protective Footwear. The ensemble element of the protective ensemble that provides chemical protection and physical protection to the feet, ankles, and lower legs.

3.3.29.1.6 Vapor-Protective Gloves. The ensemble element of the protective ensemble that provides chemical protection to the hands and wrists.

3.3.29.2 NFPA 1992-Certified Ensembles and Ensemble Elements.

3.3.29.2.1* Liquid Splash-Protective Ensemble. Multiple elements of compliant protective clothing and equipment products that, when worn together, provide protection from some, but not all, risks of hazardous materials emergencies involving liquids to the torso, legs, arms, head, hands, and feet.

3.3.29.2.2* Liquid Splash-Protective Footwear. The element of the protective ensemble or the item of protective clothing that provides liquid chemical protection and physical protection to the feet, ankles, and lower legs.

3.3.29.2.3* Liquid Splash-Protective Garment. The element of the protective ensemble or the item of protective clothing that provides liquid chemical protection to the upper and lower torso, arms, and legs, but excluding the head, hands, and feet.

3.3.29.2.4 Liquid Splash-Protective Glove. The element of the protective ensemble or the item of protective clothing that provides liquid chemical protection to the hands and wrists.

3.3.29.2.5* Liquid Splash-Protective Hood. The element of the protective ensemble or an item of protective clothing that provides liquid chemical protection and physical protection to the head and neck.

3.3.29.3 NFPA 1994-Certified Ensembles and Ensemble Elements.

3.3.29.3.1 Class 1 Hazmat/CBRN Protective Ensemble. An ensemble comprising ensemble elements that, when worn together, are designed to protect emergency responders at hazardous materials emergencies and CBRN terrorism incidents involving vapor or liquid chemical hazards where concentrations are at or above immediately dangerous to life and health (IDLH) levels, thus requiring the use of self-contained breathing apparatus (SCBA).

3.3.29.3.2 Class 2 Hazmat/CBRN Protective Ensemble. An ensemble comprising ensemble elements that, when worn together, are designed to protect emergency responders at hazardous materials emergencies and CBRN terrorism incidents involving vapor or liquid chemical hazards where concentrations are at or above IDLH levels, thus requiring the use of self-contained breathing apparatus (SCBA).

3.3.29.3.3 Class 3 Hazmat/CBRN Protective Ensemble. An ensemble comprising ensemble elements that, when worn together, are designed to protect emergency responders at hazardous materials emergencies and CBRN terrorism incidents involving low levels of vapor or liquid chemical hazards where concentrations are below IDLH levels, thus permitting the use of CBRN air-purifying respirators (APR) or CBRN-powered air-purifying respirators (PAPR).

3.3.29.3.4 Class 4 Hazmat/CBRN Protective Ensemble. An ensemble comprising ensemble elements that, when worn together, are designed to protect emergency responders at hazardous materials emergencies and CBRN terrorism incidents involving biological or radiological particulate hazards where concentrations are below IDLH levels, thus permitting the use of APR or PAPR equipment.

3.3.29.3.5 Class 5 Hazmat/CBRN Protective Ensemble. An ensemble comprising ensemble elements that, when worn together, are designed to protect emergency responders at hazardous materials emergencies and CBRN terrorism incidents involving flammable gases not toxic to the skin where the potential exists for chemical flash fires, further requiring the use of SCBA equipment.

3.3.30* Exhaust Valve. One-way vent that releases exhaust to the outside environment and prevents entry of outside environment.

3.3.31* External Fittings. Any component that allows the passage of gases, liquids, or electrical current from the outside to the inside of the element or item as well as any fitting externally located on, and part of, the ensemble that is not part of the garment material, visor material, gloves, footwear, seams, or closure assembly.

3.3.32 Flammable or Explosive Atmospheres. Atmospheres containing solids, liquids, vapors, or gases at concentrations that will burn or explode if ignited.

3.3.33 Fluorescence. A process by which radiant flux of certain wavelengths is absorbed and reradiated nonthermally in other, usually longer, wavelengths.

3.3.34 Follow-Up Program. The sampling, inspections, tests, or other measures conducted by the certification organization on a periodic basis to determine the continued compliance of labeled and listed products that are being produced by the manufacturer to the requirements of this standard.

3.3.35 Footwear. The element of the protective ensemble that provides protection to the foot, ankle, and lower leg.

3.3.35.1 Standard Footwear. Footwear approved by the authority having jurisdiction for wear with protective garments as defined in 3.3.29 and, where required, worn with a footwear cover.

3.3.36* Footwear Cover. The element of the protective ensemble to be worn over standard footwear to provide barrier and physical protection to the wearer's feet.

3.3.37 Footwear Material. The primary material(s) used in the construction of the footwear.

3.3.38 Footwear Upper. That portion of the footwear element above the sole, heel, and insole.

3.3.39 Garment. The element of the protective ensemble that provides protection to the upper and lower torso, head, arms, and legs; excludes the hands and feet.

3.3.40 Garment Closure. The garment component designed and configured to allow the wearer to don (put on) and doff (take off) the garment.

3.3.41 Garment Material. The primary protective material(s) used in the construction of the garment.

3.3.42 Gas.

3.3.42.1 Cryogenic Gas. A refrigerated liquid gas having a boiling point below -130°F (-90°C) at atmospheric pressure.

3.3.42.2* Liquefied Gas. A gas that, under its charged pressure, is partially liquid at 21°C (70°F).

3.3.43 Glove. The element of the protective ensemble that provides protection to the wearer's hands and wrists.

3.3.43.1 Outer Glove. A glove worn over another glove component to provide additional protection to the wearer and meet the requirements of this standard.

3.3.44 Glove Body. The part of the glove that extends from the tip of the fingers to the wrist crease or to a specified distance beyond the wrist crease.

3.3.45 Glove Material. The primary material(s) used in the construction of gloves.

3.3.46* Gusset. The part of the protective footwear that is a relatively flexible material joining the footwear upper (quarter) and the tongue, which is intended to provide expansion of the footwear front to enable donning of the footwear while maintaining continuous moisture integrity of the footwear.

3.3.47 Hazard. A source of possible injury or damage to health.

3.3.48* Hazardous Materials. Matter (solid, liquid, or gas) or energy that, when released, is capable of creating harm to people, the environment, and property; includes weapons of mass destruction (WMD) as defined in 18 USC 2332a, "Use of Weapons of Mass Destruction," and all other criminal use of hazardous materials.

3.3.49* Hazardous Materials Emergencies. Incidents involving the release or potential release of hazardous materials.

3.3.50 Hood. The element of the protective ensemble that provides protection to the wearer's head and neck.

3.3.51 Insole. The inner part of the protective footwear upon which the foot rests and that conforms to the bottom of the foot.

3.3.52 Integrity Footwear Cover. A component of the protective footwear element designed and configured to be worn over an outer boot to provide footwear protection when integrated with the protective ensemble.

3.3.53 Interface Component(s). Any material, part, or subassembly used in the construction of the compliant product that provides limited protection to interface areas.

3.3.54* Ionizing Radiation. Radiation of sufficient energy to alter the atomic structure of materials or cells with which it interacts, including electromagnetic radiation such as x-rays, gamma rays, and microwaves and particulate radiation such as alpha and beta particles.

3.3.55 Ladder Shank. Reinforcement to the midsole area of protective footwear designed to provide additional support to the instep when standing on a ladder rung.

3.3.56 Liquefied Gas. See 3.3.42.2.

3.3.57 Lower Torso. The area of the body trunk below the waist, excluding the legs, ankles, and feet.

3.3.58 Maintenance. The inspection, service, and repair of protective clothing and equipment, including the determination for removal from service.

3.3.59 Manufacturer. The entity that assumes the liability for the compliant product.

3.3.60 Manufacturing Facility. The facility involved in the production, assembly, or final inspection or labeling of the compliant end product.

3.3.61 Material.

3.3.61.1 Protective Clothing Material. Any material or composite used in the construction of protective ensemble and ensemble elements.

3.3.62 Melt. A response to heat by a material resulting in evidence of flowing or dripping.

3.3.63 Model. The collective term used to identify a group of individual ensembles or elements made of the same basic design and components from a single manufacturer, produced by the same manufacturing and quality assurance procedures, and covered by the same certification.

3.3.64* Nonencapsulating Ensemble. A type of ensemble that does not fully cover the wearer's respirator and relies on the facepiece of the respirator to have an interface with the garment to complete the enclosure of the wearer.

3.3.65 Outer Boot. An item of footwear worn over the sock to provide physical protection and meet the requirements of this standard.

3.3.66* Outer Garment. A supplemental garment worn over the garment element to provide physical protection and meet the base or optional requirements of this standard.

3.3.67 Package. The wrapping or enclosure directly containing gloves, footwear, a hood, or a face protection device.

3.3.68 Package Product Label. The product label that is printed on or attached to a package containing one or more compliant products. (See also 3.3.73, *Product Label*.)

3.3.69* Particulates. Solid matter that is dispersed in air as a mixture.

3.3.70 Percent Inward Leakage. The ratio of vapor concentration inside the ensemble versus the vapor concentration outside the ensemble expressed as a percentage.

3.3.71 Pressure-Sensitive Adhesive Tape. A form of tape that is tacky and adheres at room temperature by pressure without any other form of adhesive activation such as light, heat, or chemical reaction.

3.3.72 Primary Materials. Element layers limited to the garment material, hood material, visor material, glove material, footwear material, and, if present, elastomeric interface material that provide protection from chemical and physical hazards.

3.3.73* Product Label. A label or marking affixed by the manufacturer to each compliant ensemble and ensemble element, containing compliance statements, certification statements, general information, care, and maintenance data. The product label is not the certification organization's label, symbol, or identifying mark; however, the certification organization's label, symbol, or identifying mark is attached to or a part of the product label.

3.3.74 Puncture-Resistant Device. A reinforcement to the bottom of protective footwear that is designed to provide puncture resistance.

3.3.75 Radiological and Nuclear Particulate Terrorism Agents. See 3.3.4.5, Radiological Particulate Terrorism Agents.

3.3.76 Recall System. The action taken by which a manufacturer identifies an element, provides notice to the users, withdraws an element from the marketplace and distribution sites, and returns the element to the manufacturer or other acceptable location for corrective action.

3.3.77* Respirator. A certified device that provides respiratory protection for the wearer and is worn as part of the ensemble.

3.3.78 Retroreflection. The reflection of light in which the reflected rays are preferentially returned in the direction close to the opposite of the direction of the incident rays, with this property being maintained over wide variations of the direction of the incident rays.

3.3.79 Ruggedized. A category of ensembles with increased physical durability.

3.3.80 Safety Alert. The action by which a manufacturer identifies a specific compliant product or a compliant product component, provides notice to users of the compliant product, and informs the marketplace and distributors of potential safety concerns regarding the product or component.

3.3.81 Sample. An amount of the material, product, or assembly to be tested that is representative of the item as a whole.

3.3.82 Seam. Any permanent attachment of two or more materials, excluding external fittings, gaskets, and garment closure assemblies, in a line formed by joining the separate material pieces.

3.3.83* Self-Contained Breathing Apparatus (SCBA). An atmosphere-supplying respirator that supplies a respirable air atmosphere to the user from a breathing air source that is independent of the ambient environment and designed to be carried by the user.

3.3.84* Single-Use Item. A designation applied to an ensemble or ensemble element indicating its one time use followed by disposal.

3.3.85* Sock. An extension of the garment leg or a separate item that covers the entire foot and is intended to be worn inside a protective outer boot.

3.3.86 Specimen. The conditioned element, item, component, or composite that is subjected to testing. Specimens are taken from samples. In some tests, the specimen and sample can also be the same element, item, component, or composite.

3.3.87 Storage Life. The date to remove from service an ensemble or element that has undergone proper care and maintenance in accordance with manufacturer's instructions but has not been used either in training or at actual incidents.

3.3.88 Suit. See 3.3.39, Garment.

3.3.89 Suit Material. See 3.3.41, Garment Material.

3.3.90* Tethered Applications. Applications in which a hose or line is attached to the garment or hood portion of an ensemble via an external fitting mounted on the garment material that is further connected to a fixed location external to the garment.

3.3.91* Tongue. The part of the protective footwear that is provided for protective footwear with a closure that extends from the vamp to the top line of the footwear between sides of the footwear upper and is exposed to the exterior environment when the footwear is correctly donned.

3.3.92 Trace Number. A code that can be used to retrieve the production history of a product (e.g., a lot or serial number).

3.3.93 Upper. That part of the protective footwear including, but not limited to, the toe, vamp, quarter, shaft, collar, and throat; but not including the sole with heel, puncture-resistant device, and insole.

3.3.94 Upper Torso. The area of the body trunk above the waist and extending to the shoulder; excludes the arms, wrists, and hands.

3.3.95* Visibility Materials. Fluorescent and retroreflective materials used in the construction of garments to provide conspicuity for the purpose of providing both daytime and nighttime visibility of the wearer.

3.3.96 Visor Material. The primary transparent material(s) that allows the wearer to see outside the protective ensemble or hood.

3.3.97 Weapon of Mass Destruction (WMD). (1) Any destructive device, such as any explosive, incendiary, or poison gas bomb, grenade, rocket having a propellant charge of more than 4 oz (113 grams), missile having an explosive or incendiary charge of more than 0.25 oz (7 grams), mine, or similar device; (2) any weapon involving toxic or poisonous chemicals; (3) any weapon involving a disease organism; or (4) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.

3.3.97.1 Radiological Weapons of Mass Destruction.

3.3.97.1.1 Improvised Nuclear Device (IND). An illicit nuclear weapon that is bought, stolen, or otherwise obtained from a nuclear state (that is, a national government with nuclear weapons), or a weapon fabricated from fissile material that is capable of producing a nuclear explosion.

3.3.97.1.2 Radiation Exposure Device (RED). A device intended to cause harm by exposing people to radiation without spreading radioactive material.

3.3.97.1.3 Radiological Dispersal Device (RDD). A device designed to spread radioactive material through a detonation of conventional explosives or other means.

3.3.98 Wear Surface. A footwear term for the bottom of the sole, including the heel.

Chapter 4 Certification

4.1 General.

4.1.1 The process of certification of protective ensembles and ensemble elements as being compliant with NFPA 1991, NFPA 1992, and NFPA 1994, as incorporated within the 2022 edition of NFPA 1990, shall meet the requirements of 4.1 through 4.8.

4.1.2 All compliant ensembles and ensemble elements that are labeled as being compliant with this standard shall meet or exceed all the applicable requirements specified in this standard and shall be certified.

4.1.3 All certification shall be performed by a certification organization that meets at least the requirements specified in Section 4.2 and that is accredited for personal protective equipment in accordance with ISO/IEC 17065, *Conformity assessment — Requirements for bodies certifying products, processes, and services*. The accreditation shall be issued by an accreditation body operating in accordance with ISO/IEC 17011, *Conformity assessment — Requirements for accreditation bodies accrediting conformity assessment bodies*.

4.1.4* Manufacturers shall not claim compliance with portions or segments of the applicable requirements of this standard and shall not use the NFPA name or the name or identification of this standard in any statements about their respective product(s) unless the product(s) are certified as compliant with this standard.

4.1.4.1 In order to label products according to Chapter 5 of this standard, manufacturers shall demonstrate that their products meet all the applicable design requirements and performance requirements as outlined in Chapter 6 and Chapter 7, respectively.

4.1.5 All compliant protective ensembles and ensemble elements shall be labeled and listed.

4.1.5.1 The certification organization shall publicly list the following information for the certified ensembles or ensemble elements where applicable:

- (1) Manufacturer's name
- (2) Model number (which might include the SKU, minus the socks)
- (3) Description of the item

- (4) Glove manufacturer's name and model number
- (5) Footwear manufacturer's name and model number
- (6) Respirator manufacturer's name and model number
- (7) Requirements to which the ensemble(s) or ensemble element(s) are certified
- (8) Standard to which the ensemble(s) or ensemble element(s) are certified
- (9) Hood manufacturer's name and model number

4.1.6 All compliant ensembles and ensemble elements shall have product labels that meet the applicable requirements specified in Chapter 5.

4.1.7* The certification organization's label, symbol, or identifying mark shall be attached to the product label, shall be part of the product label, or shall be immediately adjacent to the product label.

4.1.8 The certification organization shall not issue any new certifications based on the following standards on or after the NFPA effective date of the 2022 edition of NFPA 1990:

- (1) 2016 edition of NFPA 1991
- (2) 2018 edition of NFPA 1992
- (3) 2018 edition of NFPA 1994

4.1.9 The certification organization shall not permit any manufacturer to continue to label any ensembles or ensemble elements that are certified as compliant with the 2016 edition of NFPA 1991, the 2018 edition of NFPA 1992, or the 2018 edition of NFPA 1994 on or after the NFPA effective date for the 2022 edition of NFPA 1990, plus 12 months.

4.1.10 The certification organization shall require manufacturers to remove all certification labels and product labels indicating compliance with the 2016 edition of NFPA 1991, the 2018 edition of NFPA 1992, or the 2018 edition of NFPA 1994 from all ensembles and ensemble elements that are under the control of the manufacturer on the effective date of the 2022 edition of NFPA 1990, plus 12 months, and the certification organization shall verify that this action is taken.

4.1.11 Scope.

4.1.11.1 This standard shall not be construed as addressing all of the safety concerns, if any, associated with its use for the designing, manufacturing, testing, or certifying of product to meet the requirements of this standard. It shall be the responsibility of the persons and organizations that use this standard to establish safety and health practices and determine the applicability of regulatory limitations prior to use of this standard.

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

4.1.12 Purpose.

4.1.12.1 The purpose of Chapters 4 through 8 shall be to establish a minimum level of protection for emergency response personnel against adverse vapor, liquid-splash, and particulate environments during hazardous materials incidents and against specified chemical and biological terrorism agents in vapor, liquid-splash, and particulate environments during CBRN terrorism incidents.

4.1.12.2 Controlled laboratory tests used to determine compliance with the performance requirements of this standard shall not be deemed as establishing performance levels for all situations to which personnel can be exposed.

4.1.12.3 This standard is not intended to be utilized as a detailed manufacturing or purchase specification but shall be permitted to be referenced in purchase specifications as minimum requirements.

4.2 Certification Program.

4.2.1* The certification organization shall not be owned or controlled by manufacturers or vendors of the product being certified.

4.2.2 The certification organization shall be primarily engaged in certification work and shall not have a monetary interest in the product's ultimate profitability.

4.2.3 The certification organization shall be accredited for personal protective equipment in accordance with ISO/IEC 17065. The accreditation shall be issued by an accreditation body operating in accordance with ISO/IEC 17011.

4.2.4 The certification organization shall refuse to certify products to this standard if the products do not comply with all the applicable requirements of this standard.

4.2.5* The contractual provisions between the certification organization and the manufacturer shall specify that certification is contingent on compliance with all the applicable requirements of this standard.

4.2.5.1 The certification organization shall not offer or confer any conditional, temporary, or partial certifications.

4.2.5.2 Manufacturers shall not be authorized to use any label or reference to the certification organization on products that are not compliant with all the applicable requirements of this standard.

4.2.6* The certification organization shall have access to laboratory facilities and equipment for conducting proper tests to determine product compliance.

4.2.6.1 The certification organization laboratory facilities shall have a program in place and functioning for the calibration of all instruments, and procedures shall be in place to ensure proper control of all testing.

4.2.6.2 The certification organization laboratory facilities shall follow good practice regarding the use of laboratory manuals, form data sheets, documented calibration and calibration routines, performance verification, proficiency testing, and staff qualification and training programs.

4.2.7 The certification organization shall require the manufacturer to establish and maintain a quality assurance program that meets the requirements of Section 4.5.

4.2.7.1* The certification organization shall require the manufacturer to have a safety alert and product recall system, as specified in Section 4.8, as part of the manufacturer's quality assurance program.

4.2.7.2 The certification organization shall audit the manufacturer's quality assurance program to ensure that the quality assurance program provides continued product compliance with this standard.

4.2.8 The certification organization and the manufacturer shall evaluate any changes affecting the form, fit, or function of compliant products to ensure their continued certification to this standard.

4.2.9* The certification organization shall have a follow-up inspection program for the manufacturing facility's compliant product with at least two random and unannounced visits per 12-month period to verify the product's continued compliance. Where portions of the production process are carried out by multiple facilities, the certification organization shall determine the appropriate follow-up program for the facilities that most closely meet the definition of a manufacturing facility (*See 3.3.60, Manufacturing Facility*).

4.2.9.1 As part of the follow-up inspection program, the certification organization shall select sample compliant product at random from the manufacturing facility's production line, from the manufacturer's or manufacturing facility's in-house stock, or from the open market.

4.2.9.2 Sample product shall be evaluated by the certification organization to verify the product's continued compliance and to ensure that the materials, components, and manufacturing quality assurance systems are consistent with the materials, components, and manufacturing quality assurance systems that were inspected and tested by the certification organization during initial certification and annual reverification.

4.2.9.3 The certification organization shall be permitted to conduct specific testing to verify a product's continued compliance.

4.2.9.4 For products, components, and materials where prior testing, judgment, and experience of the certification organization have shown results to be in jeopardy of not complying with this standard, the certification organization shall conduct more frequent testing of sample product, components, and materials against the applicable requirements of this standard in accordance with 4.8.1.

4.2.10 The certification organization shall have in place a series of procedures, as specified in Section 4.6, that address reports of situations in which a compliant product is subsequently found to be hazardous.

4.2.11 The certification organization's operating procedures shall include a mechanism for the manufacturer to appeal decisions. The procedures shall include the presentation of information from both sides of a controversy to a designated appeals panel.

4.2.12 The certification organization shall be in a position to use legal means to protect the integrity of its name and label. The name and label shall be registered and legally defended.

4.3 Inspection and Testing.

4.3.1 For both initial certification and recertification of protective ensembles and ensemble elements, the certification organization shall conduct both inspection and testing as specified in this section.

4.3.2 All inspections, evaluations, conditioning, and testing for certification or for annual verification shall be conducted by a certification organization's testing laboratory that is accredited in accordance with the requirements of ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*.

4.3.2.1 The certification organization's testing laboratory's scope of accreditation to ISO/IEC 17025 shall encompass testing of personal protective equipment.

4.3.2.2 The accreditation of a certification organization's testing laboratory shall be issued by an accreditation body operating in accordance with ISO/IEC 17011.

4.3.3 A certification organization shall be permitted to utilize results from conditioning and testing conducted by a product or component manufacturer for certification or annual verification provided the manufacturer's testing laboratory meets the requirements specified in 4.3.3.1 through 4.3.3.5.

4.3.3.1 The manufacturer's testing laboratory shall be accredited in accordance with the requirements of ISO/IEC 17025.

4.3.3.2 The manufacturer's testing laboratory's scope of accreditation to ISO/IEC 17025 shall encompass testing of personal protective equipment.

4.3.3.3 The accreditation of a manufacturer's testing laboratory shall be issued by an accreditation body operating in accordance with ISO/IEC 17011.

4.3.3.4 The certification organization shall approve the manufacturer's testing laboratory.

4.3.3.5 The certification organization shall determine the level of supervision and witnessing of the conditioning and testing required for the certification or annual verification conducted at the manufacturer's testing laboratory.

4.3.4 Sampling levels for testing and inspection shall be established by the certification organization and the manufacturer to ensure reasonable and acceptable reliability at a reasonable and acceptable confidence level that products certified to this standard are compliant, unless such sampling levels are specified herein.

4.3.5 Inspection by the certification organization shall include a review of all product labels to ensure that all the required label attachments, compliance statements, certification statements, and other product information are at least as specified for the ensembles and ensemble elements per the applicable requirements of Chapter 5.

4.3.6 Inspection by the certification organization shall include an evaluation of any symbols or graphic representations used on product labels or in user information, as permitted by 5.1.1.5, to ensure that the symbols or graphic representations are clearly explained in the product's user information package.

4.3.7 Inspection by the certification organization shall include a review of the user information required by the applicable sections of Chapter 5 to ensure that the information has been developed and is available.

4.3.8 Inspection by the certification organization shall include a review of the Technical Data Package to determine compliance with the applicable requirements of Chapter 5.

4.3.9 Inspection and evaluation by the certification organization for determining compliance with the applicable design requirements specified in Chapter 6 shall be performed on whole or complete products.

4.3.10 Testing to determine product compliance with the applicable performance requirements specified in Chapter 7 shall be conducted by the certification organization in accordance with the specified testing requirements of Chapter 8.

4.3.10.1 Testing shall be performed on specimens representative of materials and components used in the actual construction of the protective ensembles and ensemble elements.

4.3.10.2 The certification organization shall also be permitted to use sample materials cut from a representative product.

4.3.11 The certification organization shall accept from the manufacturer, for evaluation and testing for certification, only product or product components that are the same in every respect as the actual final products or product components.

4.3.12 The certification organization shall not allow any modifications, pretreatment, conditioning, or other such special processes of the product or any product component prior to the product's submission for evaluation and testing by the certification organization.

4.3.13 The certification organization shall not allow the substitution, repair, or modification, other than as specifically permitted herein, of any product or any product component during testing.

4.3.14 The certification organization shall not allow test specimens that have been conditioned and tested for one method to be reconditioned and tested for another test method unless specifically permitted by the test method.

4.3.15 The certification organization shall test ensemble elements with the specific ensemble(s) with which they are to be certified.

4.3.16* Any change in the design, construction, or material of a compliant product shall necessitate new inspection and testing to verify its compliance with all the applicable requirements of this standard that the certification organization determines can be affected by such change. This recertification shall be conducted before labeling the modified product as being compliant with this standard.

4.3.17 The manufacturer shall maintain all the design and performance inspection and test data from the certification organization used in the certification of the manufacturer's compliant product. The manufacturer shall provide such data, upon request, to the purchaser or authority having jurisdiction.

4.3.18 The certification organization shall ensure that the manufacturer tests each vapor-protective ensemble for gastight integrity as specified in ASTM F1052, *Standard Test Method for Pressure Testing Vapor Protective Suits*. Each ensemble shall show an ending pressure of at least 797 Pa (3.2 in. water gauge) pressure. The date of the test shall be placed on the product label as specified in 5.1.1.7(9). The manufacturer shall provide the result for each ensemble.

4.4 Annual Verification.

4.4.1 General Annual Verification of Product Compliance.

4.4.1.1 All ensemble and ensemble element models that are labeled as being compliant with this standard shall, on an annual basis, undergo a verification evaluation that includes inspection, review of all design requirements, and testing to all performance requirements as required by this standard.

4.4.1.2 Any change that affects the ensemble or ensemble element performance requirements of this standard shall constitute a different model.

4.4.1.3 For the purposes of this standard, models shall include each unique pattern, style, or design of individual elements.

4.4.1.4 Samples of the ensembles, ensemble elements, and their components for verification shall be acquired from the manufacturer or component supplier during random and unannounced visits as part of the follow-up inspection program. The certification organization shall acquire a sufficient quantity of samples to be tested for verification as required by 4.4.2, 4.4.3, or 4.4.4, depending on the applicable certification standard.

4.4.1.5 Sample ensembles, ensemble elements, and their components shall be inspected, evaluated, and tested as required by 4.4.2, 4.4.3, or 4.4.4, depending on the applicable certification standard.

4.4.1.6 The manufacturer shall maintain all design, inspection, performance, and test data from the certification organization produced during the verification of the manufacturer's models and components. The manufacturer shall provide such data, upon request, to the purchaser or the authority having jurisdiction.

4.4.2 Annual Verification of Product Compliance Specific to NFPA 991.

4.4.2.1 Each vapor-protective ensemble shall be inspected and evaluated based on all the applicable design requirements specified in Chapter 6.

4.4.2.2 A single specimen of each vapor-protective ensemble shall be tested for overall performance as specified in Chapter 7 using the following sequence of tests:

- (1) The vapor-protective ensemble specimen shall be tested for liquidtight integrity as specified in 7.1.1.1.
- (2) The vapor-protective ensemble specimen shall be tested for overall function and integrity as specified in 7.1.1.1.
- (3) The vapor-protective ensemble specimen shall be tested for airflow capacity as specified in 7.1.1.1.5 and 7.1.1.1.5.1.
- (4) A minimum of one new vapor-protective ensemble specimen shall be tested for overall inward leakage as specified in 7.1.1.1.1.
- (5) If certified for optional chemical flash fire protection as specified in 7.1.8, a new vapor-protective ensemble specimen shall be tested for overall ensemble flash protection as specified in 7.1.8.1.

4.4.2.3 All base performance requirements, optional chemical flash fire performance requirements, and optional liquefied gas performance requirements shall be evaluated as specified in Chapter 7, except the requirements in 7.1.1.3.3 and 7.1.1.3.4, with the following modifications:

- (1) Chemical permeation resistance testing shall be limited to the testing specified in 7.2.2 and limited to the following chemicals:
 - (a) Acrylonitrile
 - (b) Carbon disulfide
 - (c) Dichloromethane
 - (d) Diethylamine
 - (e) Methanol
 - (f) Tetrahydrofuran
- (2) Chemical permeation resistance testing required for ensembles certified for optional liquefied gas protection, as specified in 7.2.4, shall be limited to ammonia.

- (3) Chemical penetration resistance testing shall be limited to the testing specified in 7.2.3 and limited to the following chemicals:
 - (a) Carbon disulfide
 - (b) Dichloromethane
 - (c) Diethylamine
 - (d) Methanol
 - (e) Tetrahydrofuran
- (4) A total of two specimens shall be permitted for testing requirements. If testing is specified for both directions of a material, a total of two specimens per material direction shall be permitted for testing requirements.

4.4.3 Annual Verification of Product Compliance Specific to NFPA 1992.

4.4.3.1 Each liquid splash-protective ensemble and ensemble element shall be inspected and evaluated to all the applicable design requirements specified in Chapter 6.

4.4.3.2 Each liquid splash-protective ensemble specimen shall be tested for overall performance as specified in Chapter 7 using the following sequence of tests:

- (1) The liquid splash-protective ensemble specimen shall then be tested for overall function and integrity as specified in 7.1.1.1.4.
- (2) If certified for optional chemical flash fire protection as specified in 7.1.8, the liquid splash-protective ensemble shall be tested for overall ensemble flash protection as specified in 7.1.8.

4.4.3.3* All liquid splash-protective ensembles, ensemble elements, and components shall be evaluated as specified in Chapter 7, with the following modifications:

- (1) Chemical penetration resistance testing shall be limited to the testing specified in 7.3.2, and shall be performed using the following chemicals:
 - (a) Fuel H — surrogate gasoline [42.5 percent toluene, 42.5 percent isooctane, and 15 percent denatured ethanol, volume/volume (v/v)] as defined in ASTM D471, *Standard Test Method for Rubber Property — Effect of Liquids*.
 - (b) Methyl isobutyl ketone, CAS No. 108-10-1, >95 percent, weight/weight (w/w)
 - (c) Sulfuric acid, CAS No. 7664-93-9, 93.1 percent, w/w
- (2) A total of two specimens shall be permitted for testing requirements. If the testing is specified for both directions of a material, a total of two specimens per material direction shall be permitted for testing requirements.

4.4.4 Annual Verification of Product Compliance Specific to NFPA 1994.

4.4.4.1 One sample of each compliant product shall be inspected and evaluated using all the applicable design requirements specified in Chapter 6.

4.4.4.2 A minimum of one specimen of each compliant ensemble shall be tested for overall ensemble performance as specified in Chapter 7 using the following sequence of tests:

- (1) Where the ensemble is certified to Class 1, 2, 2R, 3, or 3R, the following sequence is permitted:
 - (a) The ensemble specimen shall be tested for liquid integrity as specified in 7.1.1.1.2.

- (b) The ensemble specimen shall be tested for overall function and integrity as specified in 7.1.1.1.4.
- (c) A new ensemble specimen shall be tested for inward vapor leakage as specified in 7.1.1.1.1.
- (d) Where the ensemble is encapsulating and certified to Class 1, 2, or 2R, the ensemble specimen shall be tested for airflow capacity as specified in 7.1.1.1.5 and 7.1.1.1.5.2.
- (2) Where the ensemble is certified to Class 4 or 4R, the following sequence is permitted:
 - (a) The ensemble specimen shall be tested for liquid integrity as specified in 7.1.1.1.2.
 - (b) The ensemble specimen shall be tested for overall function and integrity as specified in 7.1.1.1.4.
 - (c) Inward particle leakage as specified in 7.1.1.1.3 shall not be performed.
- (3) Where the ensemble is certified to Class 5, the following sequence is permitted:
 - (a) The ensemble specimen shall be tested for overall flash fire performance.
- (4) Where the ensemble is certified for optional chemical flash fire protection as specified in 7.1.8, a new ensemble shall be tested for overall ensemble flash protection as specified in 7.1.8.1.

4.4.4.3 Each ensemble, ensemble element, and component shall be tested as specified in Chapter 7, with the following modifications:

- (1) Chemical permeation resistance testing for Class 1 ensembles shall be limited to the testing specified in 7.4.2 and the following chemicals:
 - (a) Ammonia
 - (b) Acrolein
 - (c) Acrylonitrile
 - (d) Chlorine
 - (e) Dimethyl sulfate
- (2) Chemical permeation resistance testing specified for Class 2, 2R, 3, and 3R ensembles shall be limited to the testing specified in 7.4.3 and the following chemicals:
 - (a) Acrylonitrile
 - (b) Ammonia
 - (c) Dimethyl sulfate
- (3) With the exception of chemical permeation testing, a total of two specimens shall be permitted for ensemble material and component testing requirements. If the testing is specified for both directions of a material, a total of two specimens per material direction shall be permitted for testing requirements.

4.5 Manufacturers' Quality Assurance Program.

4.5.1 The manufacturer shall provide and operate a quality assurance program that meets the requirements of this section and that includes a product recall system as specified in 4.2.7.1 and Section 4.8.

4.5.2 The operation of the quality assurance program shall evaluate and test compliant product production against this standard to ensure production remains in compliance.

4.5.3 All of the following entities shall be registered to ISO 9001, *Quality management systems — Requirements*, or shall be listed as covered locations under an ISO 9001-registered entity:

- (1) Manufacturer

- (2) Manufacturing facility
- (3) Entity that directs and controls compliant product design
- (4) Entity that directs and controls compliant product quality assurance
- (5) Entity that provides the warranty for the compliant product
- (6) Entity that puts their name on the product label and markets and sells the product as their own

4.5.3.1 Registration based on the requirements of ISO 9001 shall be conducted by a registrar that is accredited for personal protective equipment in accordance with ISO/IEC 17021, *Conformity assessment — Requirements for bodies providing audit and certification of management systems*. The registrar shall affix the accreditation mark on the ISO registration certificate.

4.5.4* Where the manufacturer uses subcontractors in the construction or assembly of the compliant product, the locations and names of all the subcontractor facilities shall be documented and the documentation shall be provided to the manufacturer's ISO registrar and the certification organization.

4.6 Hazards Involving Compliant Product.

4.6.1* The certification organization shall establish procedures to be followed where situation(s) are reported in which a compliant product is subsequently found to be hazardous. These procedures shall 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*, and as modified herein.

4.6.2* Where a report of a hazard related to a compliant product is received by the certification organization, the validity of the report shall be investigated.

4.6.3 With respect to a compliant product, a hazard shall be a condition, or shall create a situation, that results in exposing life, limb, or property to an imminently dangerous or dangerous condition.

4.6.4 Where a specific hazard is identified, the determination of the appropriate action for the certification organization and the manufacturer to undertake shall take into consideration the severity of the hazard and its consequences to the safety and health of users.

4.6.5 Where it is established that a hazard is related to a compliant product, the certification organization shall determine the scope of the hazard, including the products, model numbers, serial numbers, factory production facilities, production runs, and quantities involved.

4.6.6 The certification organization's investigation shall include, but not be limited to, the extent and scope of the problem as it might apply to other compliant products or compliant product components manufactured by other manufacturers or certified by other certification organizations.

4.6.7 The certification organization shall also investigate reports of a hazard where a compliant product is gaining widespread use in applications not foreseen when the standard was written; such applications, in turn, are ones for which the product was not certified, where there is no specific scope of application provided in the standard, and where there is no limiting scope of application provided by the manufacturer in written material accompanying the compliant product at the point of sale.

4.6.8 The certification organization shall require the manufacturer of the compliant product or product component, if applicable, to assist the certification organization in the investigation and to conduct its own investigation as specified in Section 4.7.

4.6.9 Where the facts indicating a need for corrective action are conclusive and the certification organization's appeal procedures referenced in 4.2.11 have been followed, the certification organization shall initiate corrective action immediately, provided there is a manufacturer to be held responsible for such action.

4.6.10 Where the facts are conclusive and corrective action is indicated but there is no manufacturer to be held responsible, such as when the manufacturer is out of business or the manufacturer is bankrupt, the certification organization shall immediately notify relevant governmental and regulatory agencies and issue a notice to the user community about the hazard.

4.6.11* Where the facts are conclusive and corrective action is indicated, the certification organization shall take one or more of the following corrective actions:

- (1) Notification of parties authorized and responsible for issuing a safety alert when, in the opinion of the certification organization, such a notification is necessary to inform users
- (2) Notification of parties authorized and responsible for issuing a product recall when, in the opinion of the certification organization, such a recall is necessary to protect users
- (3) Removal of the mark of certification from the product
- (4) Where a hazardous condition exists and it is not practical to implement 4.6.11(1), 4.6.11(2), or 4.6.11(3), or the responsible parties refuse to take corrective action, notification of relevant governmental and regulatory agencies and issuance of a notice to the user community about the hazard

4.6.12 The certification organization shall provide a report to the organization or individual identifying the reported hazardous condition and notify them of the corrective action taken or that no corrective action is indicated.

4.6.13* Where a change to an NFPA standard(s) is felt to be necessary, the certification organization shall also provide a copy of the report and corrective actions indicated to the NFPA, and it shall also submit either a Public Input for a proposed change to the next revision of the applicable standard or a proposed Temporary Interim Amendment (TIA) to the current edition of the applicable standard.

4.7 Manufacturers' Investigation of Complaints and Returns.

4.7.1 Manufacturers shall provide corrective action in accordance with ISO 9001 or an equivalent ISO quality management system for investigating written complaints and returned products.

4.7.2 Manufacturers' records of returns and complaints related to safety issues shall be retained for at least 5 years.

4.7.3 Where the manufacturer discovers, during the review of specific returns or complaints, that a compliant product or compliant product component might constitute a potential safety risk to end users that is possibly subject to a safety alert or product recall, the manufacturer shall immediately contact the certification organization and provide all the information

about their review to assist the certification organization with their investigation.

4.8 Manufacturers' Safety Alert and Product Recall Systems.

4.8.1 Manufacturers shall establish a written safety alert system and a written product recall system that describes the procedures to be used in the event that it decides, or is directed by the certification organization, to either issue a safety alert or conduct a product recall.

4.8.2 The manufacturers' safety alert and product recall system shall provide the following:

- (1) The establishment of a coordinator and responsibilities by the manufacturer for the handling of safety alerts and product recalls
- (2) A method of notifying all dealers, distributors, purchasers, users, and the NFPA about the safety alert or product recall that can be initiated within a 1-week period following the manufacturer's decision to issue a safety alert or conduct a product recall or after the manufacturer has been directed by the certification organization to issue a safety alert or conduct a product recall
- (3) Techniques for communicating accurately and understandably the nature of a safety alert or product recall and, in particular, the specific hazard or safety issue found to exist
- (4) Procedures for removing product that is recalled and documenting the effectiveness of the product recall
- (5) A plan for either repairing, replacing, or compensating purchasers for returned product

Chapter 5 Labeling and Information

5.1 General Requirements.

5.1.1* General Product Label Requirements.

5.1.1.1 Each protective ensemble, ensemble element, clothing, or item shall have a product label permanently and conspicuously attached to or printed on the innermost surface when the ensemble, ensemble element, clothing, or item is properly assembled with all layers, components, and component parts in place.

5.1.1.2 As an alternative to the product label being attached to or printed on the protective ensemble(s), ensemble element(s), clothing, or item(s), the product label shall be permitted to be attached to, printed on, or inserted into each package containing the protective ensemble(s), ensemble element(s), clothing, or item(s).

5.1.1.2.1 Where package labels are required, the package product label shall be permanently and conspicuously located on the outside of the package or printed on the package and shall not be removed, obscured, or otherwise mutilated by the opening of the package when it is opened as intended.

5.1.1.3* For the purpose of ensuring all required statements and information appear on the product label, multiple label pieces shall be permitted if all label pieces comprising the entire product label are located adjacent to each other.

5.1.1.4 All worded portions of the required product label and package, where applicable, shall at least be in English.

5.1.1.5 Symbols and other graphic representations shall be permitted to be used to supplement worded statements on the

product label(s) if they are clearly explained in the user information.

5.1.1.6 All letters and numbers on the product label(s) and product package label(s) shall meet the following requirements:

- (1) The compliance statements in 5.2.1.1, 5.3.1.1, 5.3.1.2, 5.3.1.3, 5.3.1.4, 5.3.1.5, 5.3.1.6, 5.4.1.1, 5.4.1.2, and 5.4.1.3 shall be at least 2.5 mm ($\frac{3}{32}$ in.) high.
- (2) The certification organization's symbol shall be at least 6 mm ($\frac{1}{4}$ in.) high.
- (3) The certification organization's name shall be at least 2.5 mm ($\frac{3}{32}$ in.) high.
- (4) All other labeling information shall be at least 1.6 mm ($\frac{1}{16}$ in.) high.

5.1.1.7 In addition to the compliance statements specified in 5.1.1.6(1), the following information at a minimum, shall also be printed legibly on the product label(s):

- (1) Manufacturer's name, identification, or designation
- (2) Manufacturer's address
- (3) Country of manufacture
- (4) Model, style, or serial number
- (5) Size
- (6) The word(s) "garment," "visor," "hood," "glove," or "ensemble element," as applicable
- (7) For ensembles, the words "glove element component," "footwear element component," or "hood element component," as applicable
- (8) Where the product is classified as breathable, the words "breathable (see manufacturer's technical data package)" as required by 7.1.3.6
- (9) For NFPA 1991-compliant ensembles, the date and result (ending pressure) of compliance testing to ASTM F1052, *Standard Test Method for Pressure Testing Vapor Protective Suits*

5.1.2* General User Information Requirements.

5.1.2.1 The manufacturer shall provide user information including, at a minimum, warnings, information, and instructions with each ensemble and ensemble element.

5.1.2.2 The manufacturer shall attach the required user information, or packaging containing the user information, to the ensemble or ensemble element in such a manner that it is not possible to use the ensemble or ensemble element without being aware of the availability of the information.

5.1.2.2.1 The required user information, or packaging containing the user information, shall be attached to the ensemble or ensemble element in such a manner that a deliberate action is necessary to remove it. The manufacturer shall provide notice that the user information is to be removed only by the end user.

5.1.2.3 The manufacturer shall provide at least the following instructions and information with each ensemble and ensemble element:

- (1) Pre-use information, as follows:
 - (a) Safety considerations
 - (b) Limitations of use
 - (c) Ensemble or ensemble element marking recommendations and restrictions
 - (d) A statement that most performance properties of the ensemble or ensemble element cannot be tested by the user in the field

- (e) Closure lubricants, where applicable
- (f) Visor antifog agents or procedures, where applicable
- (g) Recommended undergarments
- (h) Warranty information
- (i) For NFPA 1992-certified ensembles and NFPA 1994-certified ensembles, the following:
 - i. A specific warning for nonencapsulated ensembles that the respirator has not been evaluated for chemical permeation resistance consistent with the other ensemble elements
 - ii. A specific warning not to use tape as a means for creating interfaces between ensemble elements
- (j) A statement that the AHJ comply with the requirements of NFPA 1891 for the selection, care, and maintenance of protective ensemble and elements
- (2) Storage information, as follows:
 - (a) Recommended practices
 - (b) Recommended conditions
 - (c) Storage life for all ensembles and ensemble elements
- (3) Donning/doffing information, as follows:
 - (a) Donning and doffing procedures
 - (b) Sizing and adjustment procedures
 - (c) Ensemble interface attachment(s) and issues
 - (d) Respirator interface with ensemble
 - (e) Where applicable, procedures for ensuring that the interface of the respirator is maintained during use
 - (f)* Where applicable, procedures for completing interfaces with detachable components
 - (g) Where applicable, instructions for removal of hands from gloves and reinsertion of hands into gloves
 - (h) Specific instructions for doffing when contaminated
- (4) Proper use information, as follows:
 - (a) A statement requiring users to comply with NFPA 1500
 - (b) For users in the United States, a statement requiring users to comply with 29 CFR 1910.132, "Personal Protective Equipment: General Requirements"
 - (c) For users in other countries, a statement requiring users to comply with national or other applicable personal protective equipment regulations
 - (d) If applicable, a statement indicating that the ensembles or ensemble elements are for single use only
 - (e) Instructions for removal and replacement of gloves and other user-replaceable components
- (5) Cleaning and maintenance information, as follows:
 - (a) Cleaning instructions and precautions with a statement instructing users not to use ensembles or ensemble elements that are not thoroughly cleaned and dried
 - (b) Inspection frequency details
 - (c) Where applicable, maintenance criteria and methods of repair
 - (d) Decontamination procedures for both chemical and biological contamination
 - (e) Instructions for removal and replacement of gloves and other user-replaceable components
- (6) Retirement and disposal criteria and consideration
- (7) For nonencapsulating ensembles where a respirator is required, the make and model of the respirator used to achieve compliance

(8)* For NFPA 1991-certified ensembles, the words "The closure has not been tested for permeation resistance"

5.1.2.4* The manufacturer shall state the storage life in years following the date of manufacture and the rationale for this determination.

5.1.2.5* For protective ensembles, the following additional instructions and information shall be provided:

- (1) The specific sequence and requirements for donning each item of the ensemble
- (2) Specific recommended methods for cleaning each element of the ensemble where elements are combined or attached
- (3)* Specific considerations for decontamination to be employed during the doffing of ensemble elements
- (4)* The specific sequence, precautions, and requirements for doffing each item of the ensemble, when contaminated, for the avoidance of cross-contamination of the individual wearer, other ensemble items, and the outside environment

5.1.3 General Technical Data Package Requirements.

5.1.3.1* The manufacturer shall designate if the ensemble or ensemble elements are for single use only and provide guidance on what constitutes a single use, if indicated.

5.2 NFPA 1991-Specific Requirements.

5.2.1 NFPA 1991-Specific Labeling Requirements.

5.2.1.1 Each vapor-protective ensemble shall have at least the following compliance statement and information on the product label:

THIS VAPOR-PROTECTIVE ENSEMBLE MEETS THE
REQUIREMENTS OF NFPA 1991, INCORPORATED IN THE
2022 EDITION OF NFPA 1990, AND THE ADDITIONAL
REQUIREMENTS INDICATED BELOW.

THE TECHNICAL DATA PACKAGE CONTAINS INFORMATION
ON CHEMICALS AND SPECIFIC CHEMICAL
MIXTURES FOR WHICH THIS ENSEMBLE IS CERTIFIED.
CONSULT TECHNICAL DATA PACKAGE AND MANUFACTURER'S
INSTRUCTIONS BEFORE USE.
DO NOT REMOVE THIS LABEL.

ADDITIONAL REQUIREMENTS	YES	NO
LIMITED FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A FLASH FIRE		
LIQUEFIED GAS PROTECTION		

5.2.1.1.1 Where the ensemble provides the optional additional protection, the YES box shall be marked for the additional requirement.

5.2.1.1.2 Where the ensemble does not provide the optional additional protection, the NO box shall be marked for the additional requirement.

5.2.1.2 Each vapor-protective ensemble element shall have at least the following compliance statement and information on the product label, with the appropriate element name inserted where indicated:

THIS [insert the element name GLOVE or FOOTWEAR here] ELEMENT MEETS THE REQUIREMENTS OF NFPA 1991, INCORPORATED IN THE 2022 EDITION OF NFPA 1990, AND THE ADDITIONAL REQUIREMENTS AS INDICATED BELOW.

THE TECHNICAL DATA PACKAGE CONTAINS INFORMATION ON CHEMICALS AND SPECIFIC CHEMICAL MIXTURES FOR WHICH THIS [insert the element name GLOVE or FOOTWEAR here] IS CERTIFIED. CONSULT THE TECHNICAL DATA PACKAGE AND MANUFACTURER'S INSTRUCTIONS BEFORE USE.
DO NOT REMOVE THIS LABEL.

ADDITIONAL REQUIREMENTS	YES	NO
LIMITED FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A FLASH FIRE		
LIQUEFIED GAS PROTECTION		

5.2.1.2.1 Where the ensemble element provides the optional additional protection, the YES box shall be marked for the additional requirement.

5.2.1.2.2 Where the ensemble element does not provide the optional additional protection, the NO box shall be marked for the additional requirement.

5.2.1.3* Where detachable components of an ensemble or ensemble element must be worn with the ensemble or ensemble element in order to be compliant with this standard or any optional requirements of this standard, at least the following statement and information shall also be printed legibly on the product label of the ensemble element that requires an additional component with all letters at least 1.6 mm ($\frac{1}{16}$ in.) high and following the product compliance statement on the label, the appropriate term inserted where indicated, and the detachable component(s) listed by type, identification and how properly worn:

FOR COMPLIANCE WITH NFPA 1991, AND [insert OPTIONAL LIMITED FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A FLASH FIRE or LIQUEFIED GAS PROTECTION or both here], THE FOLLOWING ADDITIONAL COMPONENTS MUST BE WORN IN CONJUNCTION WITH THIS VAPOR-PROTECTIVE [insert the term ENSEMBLE or ENSEMBLE ELEMENT here]:
[list detachable components here]

5.2.1.3.1 The manufacturer shall be permitted to list the detachable components in the technical data package by providing an additional statement on the label specified in 5.2.1.3 as follows:

SEE TECHNICAL DATA PACKAGE FOR A LIST OF DETACHABLE COMPONENTS.

5.2.1.3.2 Detachable components specified in 5.2.1.3 shall meet the label requirements specified in ASTM F1301, *Standard Practice for Labeling Chemical Protective Clothing*, and the requirements of 5.1.1.1 through 5.1.1.5.

5.2.2 NFPA 1991–Specific User Information Requirements.

5.2.2.1* Vapor-protective ensemble and ensemble element manufacturers shall furnish a log book with each ensemble and

ensemble element along with instructions on the log book's proper completion and maintenance.

5.2.2.2* For vapor-protective ensembles, the manufacturer shall state the model(s) and cylinder(s) size of the NFPA 1981– or NFPA 1986–compliant open-circuit SCBA worn during certification of the garment.

5.2.3 NFPA 1991–Specific Technical Data Package Requirements.

5.2.3.1 General.

5.2.3.1.1* The manufacturer shall furnish a technical data package with each vapor-protective ensemble and each ensemble element.

5.2.3.1.2* The technical data package shall contain all documentation required by this standard and the values obtained from the initial certification showing compliance with the requirements of Chapter 7 in the current edition of this standard using the reporting formats provided in Table 5.2.3.1.2(a) and Table 5.2.3.1.2(b) and by indicating “Pass” for those requirements that have no reported quantitative values and “Not applicable” for specific requirements that do not apply to the vapor-protective ensemble.

5.2.3.1.3 In the technical data package, the manufacturer shall describe the vapor-protective ensemble or ensemble elements in terms of manufacturer trade name, model number, manufacturer replaceable components and component parts, and available options such as accessories, testing devices, and sizes.

5.2.3.1.4* In the technical data package, the manufacturer shall describe the available sizes of the vapor-protective ensemble and include in that description the range in height and weight for persons fitting each particular size and information to the wearer as to whether these sizes apply to persons wearing SCBA, hard hats, communications devices, structural firefighting protective clothing, and other similar clothing or equipment.

5.2.3.2 Material and Component Descriptions.

5.2.3.2.1 Where specific clothing items, equipment, or component parts are required for certifying the vapor-protective ensemble or ensemble element as compliant with this standard, the manufacturer shall list these clothing items, equipment, or component parts in the technical data package.

5.2.3.2.2 The manufacturer shall provide, in the technical data package, the list and descriptions of the following ensemble or individual ensemble element materials and component parts, where applicable:

- (1) Garment material
- (2) Visor material
- (3) Glove material and type of attachment
- (4) Footwear material and type of attachment
- (5) Zipper/closure type and materials
- (6) Material seam types and composition
- (7) Exhaust valve type(s) and material(s)
- (8) External fitting type(s) and material(s)
- (9) External gasket type(s) and material(s)
- (10) Outer garment, glove, or boot material(s)
- (11) Type or style of head protection accommodated within the garment

Table 5.2.3.1.2(a) Format for Reporting NFPA 1991-Specific Certification Test Data in Technical Data Package

Ensemble or Ensemble Element	Performance Requirement	Test Method	Requirement	Result
Base Requirements				
Ensemble	Overall inward leakage	Section 8.2.2.2	$PPDF_{ys} \geq 488$ $PPDF_i$ (local) ≥ 1071	Indicate lowest average value and its location
	Liquidtight integrity	ASTM F1359/F1359M (Section 8.2.3)	No liquid penetration No liquid accumulation in outer gloves No liquid accumulation in outer boots No liquid inside ensemble next to exhaust valves	
	Overall ensemble function and integrity	ASTM F1154/ASTM F1052 (Section 8.6.1)	Ending garment pressure ≥ 80 mm (3 5/32 in.) water gauge Test subject completes tasks within 30 minutes Accommodates head protection devices meeting ANSI/ISEA Z89.1 (Type 1, Class G) Test subject has visual acuity of 20/35 or better through facepiece lens and visor Test subject identifies three of four letters on test sign Time to remove hands from and reinsert hands into gloves five times ≤ 2.5 minutes Garment closures remain engaged Protective flap stays remain closed	
	Airflow capacity	Section 8.6.2	Internal garment pressure ≤ 150 mm (6 in.) water gauge Ending garment pressure ≥ 80 mm (3 5/32 in.) water gauge	
Exhaust valve	Inward leakage	Section 8.6.3	Leakage rate ≤ 30 mL/min (1.83 in ³ /min)	
	Mounting strength	Section 8.5.4	Strength > 135 N (30 lbf)	
External fitting	Installation effect on integrity	ASTM F1052 (Section 8.2.1)	Ending garment pressure ≥ 80 mm (3 5/32 in.) water gauge	
	Pull-out strength (tethered applications)	Section 8.5.5	Strength > 1000 N (225 lbf)	
	Pull-out strength (non-tethered applications)	Section 8.5.5	Strength > 1000 N (225 lbf)	
Garment material	Chemical permeation resistance	ASTM F739 (Section 8.3.1.1)	Cumulative permeation ≤ 6.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 2.0 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Sulfur mustard (HD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 4.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 1.33 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Soman (GD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 1.25 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 0.43 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds No melting and dripping	
	Burst strength	ASTM D751 (Section 8.5.1)	Strength > 200 N (45 lbf)	

(continues)

Table 5.2.3.1.2(a) *Continued*

Ensemble or Ensemble Element	Performance Requirement	Test Method	Requirement	Result
	Puncture propagation tear resistance	ASTM D2582 (Section 8.5.2)	Tear resistance ≥ 49 N (11 lbf)	
	Cold temperature bending	ASTM D747 (Section 8.5.11.1)	Bend moment ≤ 0.057 N·m (0.5 in.-lb)	
Garment seam	Chemical permeation resistance	ASTM F739 (Section 8.3.1.1)	Cumulative permeation ≤ 6.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 2.0 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Sulfur mustard (HD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 4.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 1.33 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Soman (GD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 1.25 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 0.43 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Seam strength	ASTM D751 (Section 8.5.3)	Strength > 67 N/25 mm (15 in.-lbf)	
Garment closure	Chemical penetration resistance	ASTM F903 (Section 8.3.3)	No penetration of 15 liquid chemicals	
	Closure strength	ASTM D751 (Section 8.5.3)	Strength > 67 N/25 mm (15 in.-lbf)	
Visor material	Chemical permeation resistance	ASTM F739 (Section 8.3.1.1)	Cumulative permeation ≤ 6.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 2.0 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Sulfur mustard (HD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 4.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 1.33 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Soman (GD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 1.25 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 0.43 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds No melting and dripping	
	Visor high-mass impact resistance	Section 8.5.10	No full-thickness cracks, holes, or fractures	
	Cold temperature bending	Section 8.5.11.2	No cracking or evidence of visual damage	
Visor seam	Chemical permeation resistance	ASTM F739 (Section 8.3.1.1)	Cumulative permeation ≤ 6.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 2.0 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Sulfur mustard (HD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 4.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 1.33 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Soman (GD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 1.25 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 0.43 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Seam strength	ASTM D751 (Section 8.5.3)	Strength > 67 N/25 mm (15 in.-lbf)	
Elastomeric interface material	Chemical permeation resistance	ASTM F739 (Section 8.3.1.1)	Cumulative permeation ≤ 6.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 2.0 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Sulfur mustard (HD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 4.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 1.33 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Soman (GD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 1.25 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 0.43 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Elongation	Method A of ASTM D412 (Section 8.5.6)	Elongation at rupture ≥ 125 percent	

(continues)

Table 5.2.3.1.2(a) *Continued*

Ensemble or Ensemble Element	Performance Requirement	Test Method	Requirement	Result
	Cut resistance	ASTM F1790 (Section 8.5.7)	Blade travel distance ≥ 20 mm at 50 grams (0.8 in. at 1.76 oz)	
	Puncture resistance	Method A of ASTM F1342/ F1342M (Section 8.5.8.1)	Puncture force ≥ 22 N (5 lbf)	
	Ultimate tensile strength	Method A of ASTM D412 (Section 8.5.6)	Strength ≥ 4 MPa	
	Cold temperature bending	ASTM D747 (Section 8.5.11.1)	Bend moment ≤ 0.057 N·m (0.5 in.-lb)	
Gloves	Dexterity	ASTM F2010/F2010M (Section 8.6.5)	Percent increase in bare-handed control < 600 percent	
Glove material	Chemical permeation resistance	ASTM F739 (Section 8.3.1.1)	Cumulative permeation ≤ 6.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 2.0 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Sulfur mustard (HD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 4.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 1.33 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Soman (GD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 1.25 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 0.43 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds No melting	
	Cut resistance	ASTM F1790 (Section 8.5.7)	Blade travel distance ≥ 20 mm at 150 grams (0.8 in. at 5.29 oz)	
	Puncture resistance	Method A of ASTM F1342/ F1342M (Section 8.5.8.1)	Puncture force ≥ 22 N (5 lbf)	
	Cold temperature bending	ASTM D747	Bend moment ≤ 0.057 N·m (0.5 in.-lb)	
Footwear	Impact, compression, and sole puncture resistance	ASTM F2412	Footwear meets ASTM F2413 criteria	
Footwear upper material	Chemical permeation resistance	ASTM F739 (Section 8.3.1.1)	Cumulative permeation ≤ 6.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 2.0 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Sulfur mustard (HD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 4.0 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 1.33 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Soman (GD) permeation resistance	Section 8.3.1.2	Cumulative permeation ≤ 1.25 $\mu\text{g}/\text{m}^2$ (1 hour); ≤ 0.43 $\mu\text{g}/\text{m}^2$ (first 15 minutes)	See Table 5.2.3.1.2(b)
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds No melting and dripping	
	Cut resistance	ASTM F1790 (Section 8.5.7)	Blade travel distance ≥ 20 mm at 350 grams (0.8 in. at 12.35 oz)	
	Puncture resistance	Method A of ASTM F1342/ F1342M (Section 8.5.8.1)	Puncture force ≥ 36 N (8.0 lbf)	
Footwear soles and heels	Abrasion resistance	Method A of ISO 4649 (Section 8.5.9.2)	Relative volume loss ≤ 250 mm ³	
	Slip resistance	ASTM F2913 (Section 8.6.7)	Coefficient ≥ 0.40	
Optional Flash Fire Protection Requirements				
Ensemble	Overall flash fire protection	ASTM F1930 (Section 8.4.4)	Afterflame time ≤ 5 seconds Test subject has visual acuity of 20/100 or better through facepiece lens and visor Break-open of material or seam ≤ 51 mm (2.0 in.) No evidence of dripping	

(continues)

Table 5.2.3.1.2(a) *Continued*

Ensemble or Ensemble Element	Performance Requirement	Test Method	Requirement	Result
			Percent second-degree and third-degree body burn area (optional reporting)	
Garment material	Heat transfer performance	ASTM F2700 (Section 8.4.2)	HTP rating $\geq 8 \text{ cal/cm}^2$	
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds Burn distance $\leq 100 \text{ mm}$ (4.0 in.) No melting and dripping	
Visor material	Heat transfer performance	ASTM F2700 (Section 8.4.2)	HTP rating $\geq 8 \text{ cal/cm}^2$	
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds Burn distance $\leq 100 \text{ mm}$ (4.0 in.) No melting and dripping	
Glove material	Heat transfer performance	ASTM F2700 (Section 8.4.2)	HTP rating $\geq 8 \text{ cal/cm}^2$	
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds Burn distance $\leq 100 \text{ mm}$ (4.0 in.) No melting and dripping	
Footwear material	Heat transfer performance	ASTM F2700 (Section 8.4.2)	HTP rating $\geq 12 \text{ cal/cm}^2$	
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds Burn distance $\leq 100 \text{ mm}$ (4.0 in.)	
Elastomeric interface material	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds Burn distance $\leq 100 \text{ mm}$ (4.0 in.)	
Optional Liquefied Gas Protection Requirements				
Garment material	Liquefied gas permeation resistance	ASTM F739 (Section 8.3.1.1)		See Table 5.2.3.1.2(b)
Visor material	Liquefied gas permeation resistance	ASTM F739 (Section 8.3.1.1)		See Table 5.2.3.1.2(b)
Glove material	Liquefied gas permeation resistance	ASTM F739 (Section 8.3.1.1)		See Table 5.2.3.1.2(b)
Footwear material	Liquefied gas permeation resistance	ASTM F739 (Section 8.3.1.1)		See Table 5.2.3.1.2(b)
Optional Stealth Performance				
Ensemble	Acoustic signature	Section 8.7.2	Report only (dBA)	
Each ensemble material	Color/visibility	Section 8.7.1	Y Brightness < 25	
			L* value < 55	

Table 5.2.3.1.2(b) Format for Reporting NFPA 1991-Specific Certification Permeation Test Data in Technical Data Package

Material or Seam Tested	[insert material or seam description] ^a	
	Cumulative Permeation ($\mu\text{g}/\text{cm}^2$) Over Test Period Interval	
Test Period Interval	0–15 min	0–1 hour
Base Chemicals	≤ 2.0	≤ 6.0
Acetone		
Acetonitrile		
Acrolein		
Acrylonitrile		
Anhydrous ammonia (gas)		
1,3-Butadiene (gas)		
Carbon disulfide		
Chlorine (gas)		
Dichloromethane		
Diethylamine		
Dimethylformamide		
Dimethyl sulfate		
Ethyl acetate		
Ethylene oxide (gas)		
Hexane		
Hydrogen chloride (gas)		
Methanol		
Methyl chloride (gas)		
Nitrobenzene		
Sodium hydroxide, 50% w/w		
Sulfuric acid, 96.1% w/w		
Tetrachloroethylene		
Tetrahydrofuran		
Blister Agent Requirements	≤ 1.33	≤ 4.00
Distilled Mustard		
Nerve Agent Requirements	≤ 0.40	≤ 1.25
Soman		
Optional Liquefied Gases^b	≤ 6.0	
Ammonia (liquefied)		
Chlorine (liquefied)		
Ethylene oxide (liquefied)		

^aRepeat the Result column for each material and seam tested.

^bLiquefied chemical gases are only evaluated over a 15-minute exposure period.

5.2.3.2.3 All descriptions of material composition shall specify either the generic material names or, if the composition of the material is proprietary, the trade names.

5.2.3.2.4 Where applicable, the descriptions of respective vapor-protective ensemble materials, ensemble element materials, and component part materials shall include the following information:

- (1) Visor material information (e.g., the availability of any permanent detachable covers and films)
- (2) Glove information, as follows:
 - (a) Type of linings or surface treatments
 - (b) Available glove sizes and sizing information

- (3) Footwear information, as follows:
 - (a) Type of linings or surface treatments
 - (b) Type of soles or special toe reinforcements
 - (c) Available footwear sizes
- (4) Garment zipper or closure information, as follows:
 - (a) Material(s) of construction for the closure (including chain, slide, pull, and tape for zippers)
 - (b) Location and the length of the completed closure assembly
 - (c) Description of any protective covers for flaps
- (5) Garment exhaust valves or ports information, as follows:
 - (a) Type (e.g., flapper) pressure demand
 - (b) Number and method of attachment to the garment
 - (c) Description of any protective covers or pockets
- (6) Other clothing items (e.g., outer garments) information (e.g., the type and how used with protective garment)

5.2.3.2.5 The manufacturer shall describe, in the technical data package, the type of seams or methods of attachment for the following ensemble material and component combinations:

- (1) Garment material–garment material
- (2) Garment material–visor
- (3) Garment material–glove
- (4) Garment material–footwear
- (5) Garment material–garment closure
- (6) Outer cover–outer cover

5.3 NFPA 1992-Specific Requirements.

5.3.1 NFPA 1992-Specific Labeling Requirements.

5.3.1.1 NFPA 1992-Specific Ensembles and Clothing Compliance Statements.

5.3.1.1.1 Each liquid splash-protective garment element shall have at least the following compliance statements and information on the product label:

THIS LIQUID SPLASH-PROTECTIVE GARMENT MEETS THE BASIC REQUIREMENTS OF NFPA 1992, INCORPORATED IN THE 2022 EDITION OF NFPA 1990, AND THE ADDITIONAL REQUIREMENTS INDICATED BELOW.

THE TECHNICAL DATA PACKAGE CONTAINS INFORMATION ON CHEMICALS AND SPECIFIC CHEMICAL MIXTURES FOR WHICH THIS GARMENT IS CERTIFIED. CONSULT THE TECHNICAL DATA PACKAGE AND MANUFACTURER'S INSTRUCTIONS BEFORE USE.
DO NOT REMOVE THIS LABEL.

ADDITIONAL REQUIREMENTS	YES	NO
LIMITED FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A FLASH FIRE		
CLAIM OF OPTIONAL BREATHABILITY FOR GARMENT MATERIALS		

5.3.1.1.1.1 Where the garment provides the optional limited flash fire protection above the basic requirements of this standard, the YES box shall be marked.

5.3.1.1.1.2 Where the garment does not provide the optional limited flash fire protection above the basic requirements of this standard, the NO box shall be marked.

5.3.1.1.1.3 Where the garment is represented as providing the optional breathability above the basic requirements of this standard, the YES box shall be marked.

5.3.1.1.1.4 Where the garment is not represented as providing the optional breathability above the basic requirements of this standard, the NO box shall be marked.

5.3.1.1.2 For garments where the integrity of the interfaces between the respirator and hood or garment, between the gloves and garment sleeves, and between the footwear and garment legs has not been evaluated as specified in 7.1.1.1.2, the following warning shall be provided on the product label:

WARNING — THE INTEGRITY OF THE FOLLOWING INTERFACES OF THIS GARMENT WITH THE RESPIRATOR, GLOVES, AND FOOTWEAR HAS NOT BEEN EVALUATED ACCORDING TO THE REQUIREMENTS OF NFPA 1992. USE OF THIS GARMENT IN A LIQUID EXPOSURE ENVIRONMENT MIGHT RESULT IN LIQUID PENETRATION THROUGH THESE INTERFACES.

5.3.1.2 NFPA 1992-Specific Glove Element Compliance Statements.

5.3.1.2.1 Each liquid splash-protective glove element shall have at least the following compliance statements and information on the product label:

THIS LIQUID SPLASH-PROTECTIVE GLOVE MEETS THE BASIC REQUIREMENTS OF NFPA 1992, INCORPORATED IN THE 2022 EDITION OF NFPA 1990, AND THE ADDITIONAL REQUIREMENT INDICATED BELOW.

THE TECHNICAL DATA PACKAGE CONTAINS INFORMATION ON CHEMICALS AND SPECIFIC CHEMICAL MIXTURES FOR WHICH THIS GLOVE IS CERTIFIED. CONSULT THE TECHNICAL DATA PACKAGE AND MANUFACTURER'S INSTRUCTIONS BEFORE USE.
DO NOT REMOVE THIS LABEL.

ADDITIONAL REQUIREMENT	YES	NO
LIMITED FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A FLASH FIRE		

5.3.1.2.1.1 Where the glove provides the optional limited flash fire protection above the basic requirements of this standard, the YES box shall be marked.

5.3.1.2.1.2 Where the glove does not provide the optional limited flash fire protection above the basic requirements of this standard, the NO box shall be marked.

5.3.1.2.2 Each liquid splash-protective glove shall be permitted to have the labeling information specified in 5.3.1.2.1 placed on the package label. If applicable, the statement in either 5.3.1.2.2.1 or 5.3.1.2.2.2 shall be directly printed, embossed, or attached to each glove in lettering at least 1.6 mm ($\frac{1}{16}$ in.) high.

5.3.1.2.2.1 Where the glove is not compliant with the optional limited flash fire protection above the basic requirements of this standard, the following statement shall be used:

MEETS NFPA 1992 (INCORPORATED IN THE 2022 EDITION OF NFPA 1990)

5.3.1.2.2.2 Where the glove is compliant with the optional limited flash fire protection above the basic requirements of this standard, the following statement shall be used:

MEETS FLASH FIRE ESCAPE PROTECTION REQUIREMENTS OF NFPA 1992 (INCORPORATED IN THE 2022 EDITION OF NFPA 1990)

5.3.1.3 NFPA 1992-Specific Footwear Element Compliance Statements.

5.3.1.3.1 Each liquid splash-protective footwear piece shall have at least the following compliance statements and information on the product label:

THIS LIQUID SPLASH-PROTECTIVE FOOTWEAR MEETS THE BASIC REQUIREMENTS OF NFPA 1992, INCORPORATED IN THE 2022 EDITION OF NFPA 1990, AND THE ADDITIONAL REQUIREMENT INDICATED BELOW.

THE TECHNICAL DATA PACKAGE CONTAINS INFORMATION ON CHEMICALS AND SPECIFIC CHEMICAL MIXTURES FOR WHICH THIS FOOTWEAR IS CERTIFIED. CONSULT TECHNICAL DATA PACKAGE AND MANUFACTURER'S INSTRUCTIONS BEFORE USE.
DO NOT REMOVE THIS LABEL.

ADDITIONAL REQUIREMENT	YES	NO
LIMITED FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A FLASH FIRE		

5.3.1.3.1.1 Where the footwear provides the optional limited flash fire protection above the basic requirements of this standard, the YES box shall be marked.

5.3.1.3.1.2 Where the footwear does not provide the optional limited flash fire protection above the basic requirements of this standard, the NO box shall be marked.

5.3.1.4 NFPA 1992-Specific Hood Element Compliance Statements.

5.3.1.4.1 Each liquid splash-protective hood shall have at least the following compliance statements and information on the product label:

THIS LIQUID SPLASH-PROTECTIVE HOOD MEETS THE BASIC REQUIREMENTS OF NFPA 1992, INCORPORATED IN THE 2022 EDITION OF NFPA 1990, AND THE ADDITIONAL REQUIREMENTS INDICATED BELOW.

THE TECHNICAL DATA PACKAGE CONTAINS INFORMATION ON CHEMICALS AND SPECIFIC CHEMICAL MIXTURES FOR WHICH THIS HOOD IS CERTIFIED. CONSULT THE TECHNICAL DATA PACKAGE AND MANUFACTURER'S INSTRUCTIONS BEFORE USE.
DO NOT REMOVE THIS LABEL.

ADDITIONAL REQUIREMENTS	YES	NO
LIMITED FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A FLASH FIRE		
CLAIM OF OPTIONAL BREATHABILITY FOR GARMENT MATERIALS		

5.3.1.4.1.1 Where the hood provides the optional limited flash fire protection above the basic requirements of this standard, the YES box shall be marked.

5.3.1.4.1.2 Where the hood does not provide the optional limited flash fire protection above the basic requirements of this standard, the NO box shall be marked.

5.3.1.4.1.3 Where the hood is represented as providing the optional breathability above the basic requirements of this standard, the YES box shall be marked.

5.3.1.4.1.4 Where the hood is not represented as providing the optional breathability above the basic requirements of this standard, the NO box shall be marked.

5.3.1.5 NFPA 1992-Specific Nonencapsulating Ensemble Compliance Statements.

5.3.1.5.1 Each nonencapsulating liquid splash-protective ensemble shall have at least the following compliance statements and information on the product label:

THIS NONENCAPSULATING LIQUID SPLASH-PROTECTIVE ENSEMBLE MEETS THE BASIC REQUIREMENTS OF NFPA 1992, INCORPORATED IN THE 2022 EDITION OF NFPA 1990, AND THE ADDITIONAL REQUIREMENTS INDICATED BELOW.

THE TECHNICAL DATA PACKAGE CONTAINS INFORMATION ON CHEMICALS AND SPECIFIC CHEMICAL MIXTURES FOR WHICH THIS NONENCAPSULATING ENSEMBLE IS CERTIFIED. CONSULT THE TECHNICAL DATA PACKAGE AND MANUFACTURER'S INSTRUCTIONS BEFORE USE.

DO NOT REMOVE THIS LABEL.

ADDITIONAL REQUIREMENTS	YES	NO
LIMITED FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A FLASH FIRE		
CLAIM OF OPTIONAL BREATHABILITY FOR GARMENT MATERIALS		

5.3.1.5.1.1 Where the nonencapsulating ensemble provides the optional limited flash fire protection above the basic requirements of this standard, the YES box shall be marked.

5.3.1.5.1.2 Where the nonencapsulating ensemble does not provide the optional limited flash fire protection above the basic requirements of this standard, the NO box shall be marked.

5.3.1.5.1.3 Where the garment element of the ensemble is represented as providing optional breathability above the basic requirements of this standard, the YES box shall be marked.

5.3.1.5.1.4 Where the garment element of the ensemble is not represented as providing optional breathability above the basic requirements of this standard, the NO box shall be marked.

5.3.1.5.1.5 Where the manufacturer specifies outer boot footwear element options as permitted in 7.3.5, the following additional language shall be provided as part of the product label:

OUTER BOOT FOOTWEAR OPTIONS WORN WITH THIS ENSEMBLE MUST MEASURE AT LEAST 140 mm (5.5 in.) HIGH AND BE CERTIFIED TO NFPA 1951, NFPA 1971, NFPA 1991, NFPA 1992, NFPA 1994, OR NFPA 1999.

5.3.1.6 NFPA 1992-Specific Encapsulating Ensemble Compliance Statements.

5.3.1.6.1 Each encapsulating liquid splash-protective ensemble shall have at least the following compliance statements and information on the product label:

THIS ENCAPSULATING LIQUID SPLASH-PROTECTIVE ENSEMBLE MEETS THE BASIC REQUIREMENTS OF NFPA 1992, INCORPORATED IN THE 2022 EDITION OF NFPA 1990, AND THE ADDITIONAL REQUIREMENTS INDICATED BELOW.

THE TECHNICAL DATA PACKAGE CONTAINS INFORMATION ON CHEMICALS AND SPECIFIC CHEMICAL MIXTURES FOR WHICH THIS ENCAPSULATING ENSEMBLE IS CERTIFIED. CONSULT THE TECHNICAL DATA PACKAGE AND MANUFACTURER'S INSTRUCTIONS BEFORE USE.

DO NOT REMOVE THIS LABEL.

ADDITIONAL REQUIREMENTS	YES	NO
LIMITED FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A FLASH FIRE		
CLAIM OF OPTIONAL BREATHABILITY FOR GARMENT MATERIALS		

5.3.1.6.1.1 Where the encapsulating ensemble provides the optional limited flash fire protection above the basic requirements of this standard, the YES box shall be marked.

5.3.1.6.1.2 Where the encapsulating ensemble does not provide the optional limited flash fire protection above the basic requirements of this standard, the NO box shall be marked.

5.3.1.6.1.3 Where the garment ensemble is represented as providing the optional breathability above the basic requirements of this standard, the YES box shall be marked.

5.3.1.6.1.4 Where the garment ensemble is not represented as providing the optional breathability above the basic requirements of this standard, the NO box shall be marked.

5.3.1.6.1.5 Where the manufacturer specifies outer boot footwear element options as permitted in 7.3.5, the following additional language shall be provided as part of the product label:

OUTER BOOT FOOTWEAR OPTIONS WORN WITH THIS ENSEMBLE MUST MEASURE AT LEAST 140 mm (5.5 in.) HIGH AND BE CERTIFIED TO NFPA 1951, NFPA 1971, NFPA 1991, NFPA 1992, NFPA 1994, OR NFPA 1999.

5.3.1.6.2* Where detachable components of an ensemble or ensemble element must be worn with the ensemble or ensemble element in order to be compliant with this standard or any optional requirements of this standard, at least the following statement and information shall also be printed legibly on the product label of the ensemble element that requires an additional component with all letters at least 1.6 mm ($\frac{1}{16}$ in.) high and following the product compliance statement on the label, the appropriate term inserted where indicated, and the detachable component(s) listed by type, identification and how properly worn:

“FOR COMPLIANCE WITH NFPA 1992, THE FOLLOWING ADDITIONAL COMPONENTS MUST BE WORN IN CONJUNCTION WITH THIS LIQUID SPLASH PROTECTIVE [insert the term GARMENT, GLOVE, FOOTWEAR, HOOD or ENSEMBLE here]: [list detachable components here]”

5.3.1.6.2.1 The manufacturer shall be permitted to list the detachable components in the technical data package by providing an additional statement on the label specified in 5.3.1.6.2 as follows:

SEE TECHNICAL DATA PACKAGE FOR A LIST OF DETACHABLE COMPONENTS.

5.3.1.6.2.2 Detachable components specified in 5.3.1.6.2 shall meet the label requirements specified in ASTM F1301, *Standard Practice for Labeling Chemical Protective Clothing*, and the requirements of 5.1.1.1 through 5.1.1.5.

5.3.2 NFPA 1992-Specific User Information Requirements. (Reserved)

5.3.3 NFPA 1992-Specific Technical Data Package Requirements.

5.3.3.1* The manufacturer shall furnish a technical data package for the protective ensemble, ensemble element, or clothing item upon the request of the purchaser.

5.3.3.2* The technical data package shall contain all documentation required by this standard and the values obtained from the initial certification showing compliance with the requirements of Chapter 12 in the current edition of this standard using the reporting formats provided in Table 5.3.3.2(a) and Table 5.3.3.2(b) for each ensemble, ensemble element, material, or component, as applicable.

5.3.3.2.1 The technical data package information shall indicate “Pass” for those requirements where there is no quantitative value reported and “Not applicable” for specific requirements that do not apply to the liquid splash-protective ensemble.

5.3.3.2.2 The manufacturer shall be permitted to make modifications in the tabular format to accommodate specific product features or additional materials as applicable to the certified product.

5.3.3.3 In the technical data package, the manufacturer shall describe the clothing item, ensemble element, or ensemble in terms of manufacturer trade name, model number, manufacturer replaceable components, available options, and sizes.

5.3.3.4* Descriptions of sizes shall include the range in height and weight for persons fitting each particular size (for garments), or specific sizes in accordance with Chapter 6 (for gloves and footwear), and shall provide information to the wearer as to whether these sizes apply to persons wearing SCBA, hard hats, communications devices, firefighting protective clothing, and other similar gear.

5.3.3.5 Garment Material and Component Descriptions.

5.3.3.5.1 Where specific clothing items or equipment are required for certifying the ensemble, ensemble element, or clothing item as compliant to this standard, the manufacturer shall list these clothing items or equipment in the technical data package.

5.3.3.5.2 The manufacturer shall provide, in the technical data package, the list and descriptions of the following ensemble materials and components, where applicable:

- (1) Garment material
- (2) Visor material
- (3) Glove material and type of attachment
- (4) Footwear material and type of attachment
- (5) Hood material
- (6) Zipper/closure type and materials
- (7) Material seam types and composition
- (8) Exhaust valve type(s) and material(s)
- (9) External fitting type(s) and material(s)
- (10) External gasket type(s) and material(s)
- (11) Outer garment, glove, or boot material(s)
- (12) Type or style of head protection accommodated within the garment
- (13) Interface materials

5.3.3.5.3 All descriptions of material composition shall specify either the generic material names or, if the composition of the material is proprietary, trade names.

5.3.3.5.4 Where applicable, the descriptions of respective garment materials and components shall include the following information:

- (1) Visor material (e.g., the availability of any permanent detachable covers and films)
- (2) Glove information, as follows:
 - (a) Type of linings or surface treatments
 - (b) Available glove sizes
- (3) Footwear information, as follows:
 - (a) Type of linings or surface treatments
 - (b) Type of soles or special toe reinforcements
 - (c) Available footwear sizes
- (4) Garment zipper or closure information, as follows:
 - (a) Material(s) of construction for the closure (including chain, slide, pull, and tape for zippers)
 - (b) Location and the length of the completed closure assembly
 - (c) Description of any protective covers for flaps
- (5) Other clothing items (e.g., outer garments) information (e.g., the type and how used with protective garment)

Table 5.3.3.2(a) Format for Reporting NFPA 1992-Specific Certification Test Data in Technical Data Package

Ensemble or Ensemble Element	Performance Requirement	Test Method	Requirement	Result
Base Requirements				
Ensemble	Liquidtight integrity	ASTM F1359/F1359M with modifications (Section 8.2.3)	No liquid penetration after 20 minutes No liquid accumulation in outer gloves No liquid accumulation in outer boots No liquid inside ensemble next to exhaust valves	
	Overall function and integrity	ASTM F1154 (Section 8.6.1)	No liquid penetration after 20 minutes Complete all tasks within 15 minutes Accommodates head protection devices meeting ANSI/ISEA Z89.1 (Type 1, Class G) Test subject has visual acuity of 20/35 or better through visor and facepiece lens Test subject properly identifies three out of four numbers on NFPA 704 placard at each angle Time to remove hands from and reinsert hands in gloves 5 times ≤ 2.5 minutes Garment closures remain engaged Protective flap stays remain closed	
	Airflow capacity	Section 8.6.2	Internal garment pressure ≤ 150 mm (6 in.) water gauge Ending garment pressure ≥ 80 mm (3 5/32 in.) water gauge	
Exhaust valve	Mounting strength	Section 8.5.4	Strength >135 N (30 lbf)	
External fitting	Installation effect on integrity	ASTM F1052 (Section 8.2.1)	No liquid penetration in 20 minutes in liquid integrity test	
	Pull-out strength (tethered applications)	Section 8.5.5	Strength >1000 N (225 lbf)	
	Pull-out strength (non-tethered applications)	Section 8.5.5	Strength >1000 N (225 lbf)	
Garment (or hood or sock) material	Chemical penetration resistance	ASTM F903 (Section 8.3.2)	No penetration for at least 1 hour for each of the specified chemicals	See Table 5.3.3.2(b)
	Burst strength	ASTM D751 (Section 8.5.1)	Strength ≥ 135 N (30 lbf)	
	Puncture propagation tear resistance	ASTM D2582 (Section 8.5.2)	Tear resistance ≥ 25 N (5.6 lbf)	
	Cold temperature bending	ASTM D747 (Section 8.5.11.1)	Bending moment ≤ 0.057 N·m (0.5 in.-lb)	
Garment (or hood) visor	Chemical penetration resistance	ASTM F903 (Section 8.3.2)	No penetration for at least 1 hour for each of the specified chemicals	See Table 5.3.3.2(b)
	Visor high-mass impact resistance	Section 8.5.10	No full-thickness cracks, holes, or fractures	

(continues)

Table 5.3.3.2(a) *Continued*

Ensemble or Ensemble Element	Performance Requirement	Test Method	Requirement	Result
Garment (or hood) seam	Cold temperature bending	Section 8.5.11.2	No cracking or evidence of visual damage	See Table 5.3.3.2(b)
	Chemical penetration resistance test	ASTM F903 (Section 8.3.2)	No penetration for at least 1 hour for each of the specified chemicals	
	Seam strength	ASTM D751 (Section 8.5.3)	Strength ≥ 33 N/25 mm (7.6 in.·lbf)	
Garment (or hood) closure	Closure strength	ASTM D751 (Section 9.5.3)	Strength ≥ 33 N/25 mm (7.5 in.·lbf)	
Elastomeric interface material	Chemical penetration resistance	ASTM F903 (Section 8.3.2)	No penetration for at least 1 hour for each of the specified chemicals	See Table 5.3.3.2(b)
	Elongation	Method A of ASTM D412 (Section 8.5.6)	Elongation at rupture ≥ 125 percent	
	Cut resistance	ASTM F1790 (Section 8.5.7)	Blade travel distance ≥ 20 mm at 50 g (0.8 in. at 1.76 oz)	
	Puncture resistance	Method A of ASTM F1342/F1342M (Section 8.5.8.1)	Puncture force ≥ 7 N (1.6 lbf)	
	Ultimate tensile strength	ASTM D412 (Section 8.5.6)	Strength ≥ 4 MPa (580 psi)	
Gloves	Liquidtight integrity	ASTM D5151 with modifications (Section 8.2.3.2)	No leakage	
	Dexterity	ASTM F2010/F2010M (Section 8.6.5)	Percent increase over barehanded control ≤ 200 percent	
Glove material	Chemical penetration resistance	ASTM F903 (Section 8.3.2)	No penetration for at least 1 hour for each of the specified chemicals	See Table 5.3.3.2(b)
	Cut resistance	ASTM F1790 (Section 8.5.7)	Blade travel distance ≥ 20 mm at 50 g (0.8 in. at 1.76 oz)	
	Puncture resistance	Method A of ASTM F1342/F1342M (Section 8.5.8.1)	Puncture force ≥ 9 N (2 lbf)	
	Cold temperature bending	ASTM D747 (Section 8.5.11.1)	Bending moment ≤ 0.057 N·m (0.5 in.·lb)	
Glove material seams	Chemical penetration resistance	ASTM F903 (Section 8.3.2)	No penetration for at least 1 hour for each of the specified chemicals	See Table 5.3.3.2(b)
Full footwear	Liquidtight integrity Toe impact and compression resistance; sole puncture resistance	Section 8.2.3.3 ASTM F2412	No leakage Footwear meets ASTM F2413 criteria	
Full footwear upper materials	Chemical penetration resistance	ASTM F903 (Section 8.3.2)	No penetration for at least 1 hour for each of the specified chemicals	See Table 5.3.3.2(b)
	Cut resistance	ASTM F1790 (Section 8.5.7)	Blade travel distance ≥ 20 mm at 350 g (0.8 in. at 12.35 oz)	
	Puncture resistance	Method A of ASTM F1342/F1342M	Puncture force ≥ 36 N (8.0 lbf)	
Full footwear upper material seams	Chemical penetration resistance	ASTM F903 (Section 8.3.2)	No penetration for at least 1 hour for each of the specified chemicals	See Table 5.3.3.2(b)

(continues)

Table 5.3.3.2(a) *Continued*

Ensemble or Ensemble Element	Performance Requirement	Test Method	Requirement	Result
Full footwear sole and heels	Abrasion resistance	Method A of ISO 4649 (Section 8.14)	Relative volume loss $\leq 250 \text{ mm}^3$	
	Slip resistance	ASTM F2913 (Section 8.6.7)	Coefficient ≥ 0.40	
Outer boot	Liquidtight integrity Toe impact and compression resistance; sole puncture resistance	Section 8.2.3.3 ASTM F2412	No leakage Footwear meets ASTM F2413 criteria	
Outer boot upper material	Cut resistance	ASTM F1790 (Section 8.5.7)	Blade travel distance $\geq 20 \text{ mm}$ at 350 g (0.8 in. at 12.35 oz)	
	Puncture resistance	Method A of ASTM F1342/ F1342M	Puncture force $\geq 36 \text{ N}$ (8.0 lbf)	
Outer boot sole and heels	Abrasion resistance	Method A of ISO 4649 (Section 8.14)	Relative volume loss $\leq 250 \text{ mm}^3$	
	Slip resistance	ASTM F2913 (Section 8.6.7)	Coefficient ≥ 0.40	
Footwear cover	Liquid integrity	ASTM D5151 with modifications (Section 8.2.3.2)	No leakage	
Footwear cover upper material	Cut resistance	ASTM F1790 (Section 8.5.7)	Blade travel distance $\geq 20 \text{ mm}$ at 150 g (0.8 in. at 5.29 oz)	
	Puncture resistance	Method A of ASTM F1342/ F1342M	Puncture force $\geq 15 \text{ N}$ (3.8 lbf)	
	Cold temperature bending	ASTM D747 (Section 8.5.11.1)	Bending moment $\leq 0.057 \text{ N}\cdot\text{m}$ (0.5 in.-lb)	
Footwear cover wear surface	Abrasion resistance	ASTM D3884 (Section 8.5.9.2)	Wear-through ≥ 3000 cycles	
	Slip resistance	ASTM F2913 (Section 8.6.7)	Coefficient ≥ 0.40	
Optional Flash Fire Protection Requirements				
Ensemble	Overall flash protection	ASTM F1930 (Section 8.4.4)	Afterflame times ≤ 2 seconds Test subject has visual acuity of 20/35 or better through visor and facepiece lens Break-open of material or seam $\leq 51 \text{ mm}$ (2.0 in.) No evidence of dripping Percent second-degree and third-degree body burn area (optional reporting)	
Garment material	Heat transfer performance	ASTM F2700 (Section 8.4.2)	HTP rating $\geq 8 \text{ cal/cm}^2$ (29.5 Btu/ft ²)	
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds Burn distance $\leq 100 \text{ mm}$ (4.0 in.) No melting or dripping	
Visor material	Heat transfer performance	ASTM F2700 (Section 8.4.2)	Average HTP rating $\geq 8 \text{ cal/cm}^2$ (29.5 Btu/ft ²)	
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds Burn distance $\leq 100 \text{ mm}$ (4.0 in.) No melting or dripping	
Glove material	Heat transfer performance	ASTM F2700 (Section 8.4.2)	Average HTP rating $\geq 8 \text{ cal/cm}^2$ (29.5 Btu/ft ²)	

(continues)

Table 5.3.3.2(a) *Continued*

Ensemble or Ensemble Element	Performance Requirement	Test Method	Requirement	Result
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds Burn distance ≤ 100 mm (4.0 in.) No melting or dripping	
Footwear material	Heat transfer performance	ASTM F2700 (Section 8.4.2)	Average HTP rating ≥ 8 cal/cm ² (29.5 Btu/ft ²)	
	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds Burn distance ≤ 100 mm (4.0 in.) No melting or dripping	
Elastomeric Interface Materials	Flame resistance	ASTM F1358 (Section 8.4.1)	Afterflame time ≤ 2 seconds Burn distance ≤ 100 mm (4.0 in.) No melting or dripping	
Optional Stealth Performance				
Ensemble	Acoustic signature	Section 8.7.2	Report only (dBA)	
Each ensemble material	Color/visibility	Section 8.7.1	Y Brightness < 25 L* value < 55	
Optional Breathability Claim				
Garment (or hood) material	Total heat loss	Method C of ASTM F1868 (Section 8.6.4.1)	Total heat loss ≥ 200 W/m ² (if breathability is claimed) Apparent intrinsic evaporative resistance (report only) Intrinsic thermal resistance (report only)	
	Evaporative resistance	Method B of ASTM F1868 (Section 8.6.4.2)	Evaporative resistance ≤ 30 Pa·m ² /W (if breathability is claimed)	

5.3.3.5.5 The manufacturer shall describe, in the technical data package, the type of seams or methods of attachment for the following garment material and component combinations, if applicable:

- (1) Garment material–garment material
- (2) Garment material–visor
- (3) Garment material–glove
- (4) Garment material–footwear
- (5) Garment material–garment closure
- (6) Outer cover–outer cover
- (7) Hood material–visor material
- (8) Hood material–hood material
- (9) Hood material–garment materials
- (10) Sock material–garment material (if the sock material is different from the garment material)

5.4 NFPA 1994-Specific Requirements.

5.4.1 NFPA 1994-Specific Labeling Requirements.

5.4.1.1 NFPA 1994-Specific Ensemble Compliance Statements.

5.4.1.1.1 Each protective ensemble shall have at least the following compliance statement on the product label and the appropriate number for the class of the ensemble, and the appropriate term for the type of ensemble inserted where indicated:

THIS CLASS [insert 1, 2, 2R, 3, 3R, 4, 4R, or 5 here] [insert ENCAPSULATING or NONENCAPSULATING here]
HAZARDOUS MATERIALS AND CBRN PROTECTIVE
ENSEMBLE MEETS THE REQUIREMENTS OF NFPA 1994,
INCORPORATED IN THE 2022 EDITION OF NFPA 1990,
FOR THE ABOVE NOTED CLASS.

THE TECHNICAL DATA PACKAGE CONTAINS INFORMATION ON HAZARDOUS MATERIALS AND CBRN AGENTS FOR WHICH THIS ENSEMBLE IS CERTIFIED. CONSULT THE TECHNICAL DATA PACKAGE AND MANUFACTURER'S INSTRUCTIONS BEFORE USE.
DO NOT REMOVE THIS LABEL.

5.4.1.1.2 Where the manufacturer specifies outer footwear element options as permitted in 7.4.10, the following additional language shall be provided as part of the product label:

OUTER BOOT FOOTWEAR OPTIONS WORN WITH THIS ENSEMBLE MUST MEASURE AT LEAST 140 mm (5.5 in.) HIGH AND BE CERTIFIED TO NFPA 1951, NFPA 1971, NFPA 1991, NFPA 1992, NFPA 1994, or NFPA 1999.

Table 5.3.3.2(b) Format for Reporting NFPA 1992-Specific Certification Penetration Test Data in Technical Data Package

Chemical (concentration)	Minimum Requirement*	Garment Material	Garment Visor	Garment Seam	Interface Material	Glove Material	Footwear Upper Material	Hood Material
Butyl acetate, CAS No. 123-86-4, >95%	Pass			NR				
Dimethylformamide, CAS No. 68-12-2, >95%	Pass			NR				
Fuel H (42.5% toluene, 42.5% isooctane, 15% ethanol mixture, v/v)	Pass							
Isopropyl alcohol, CAS No. 67-63-0, >91%	Pass			NR				
Methyl isobutyl ketone, CAS No. 108-10-1, >95%	Pass							
Nitrobenzene, CAS No. 98-95-3, >95%	Pass			NR				
Sodium hydroxide, CAS No. 1310-73-2, 50%	Pass			NR				
Sodium hypochlorite, 10%	Pass			NR				
Sulfuric acid, CAS No. 7664-93-9, 93.1%	Pass							
Tetrachloroethylene, CAS No. 127-18-4, >95%	Pass			NR				

NR: Indicates no requirement for testing.

*A pass result indicates no liquid penetration through the tested specimens after a 1-hour exposure with 1 minute of the exposure at 7.8 kPa (2.0 psi) hydrostatic pressure.

5.4.1.1.3 Class 5 garments shall include the following language as part of the product label:

NOT FOR STRUCTURAL FIREFIGHTING.

5.4.1.1.4 Class 5 garments with detachable liners shall include the following language as part of the product label of the outer shell:

THIS PRODUCT IS NOT COMPLIANT WITH THE
NFPA 1994 CLASS 5 REQUIREMENTS UNLESS THE LINER
IS PROPERLY DEPLOYED.

5.4.1.2 NFPA 1994-Specific Glove, Footwear, and Hood Element Compliance Statements.

5.4.1.2.1 Each glove, footwear, and hood element shall have at least the following compliance statement on the product label and the appropriate number for the class of the ensemble and the appropriate term for the type of element inserted where indicated:

THIS CLASS [insert 1, 2, 2R, 3, 3R, 4, 4R, or 5 here] HAZARDOUS MATERIALS AND CBRN PROTECTIVE [insert the element name GLOVE, FOOTWEAR, or HOOD here] ELEMENT MEETS THE REQUIREMENTS OF NFPA 1994,

INCORPORATED IN THE 2022 EDITION OF NFPA 1990,
FOR THE ABOVE NOTED CLASS.

THE TECHNICAL DATA PACKAGE CONTAINS INFORMATION ON HAZARDOUS MATERIALS AND CBRN AGENTS FOR WHICH THIS [insert the element name GLOVE, FOOTWEAR, or HOOD here] ELEMENT IS CERTIFIED. CONSULT THE TECHNICAL DATA PACKAGE AND MANUFACTURER'S INSTRUCTIONS BEFORE USE.
DO NOT REMOVE THIS LABEL.

5.4.1.2.2 Where footwear is designed and configured in accordance with 6.1.5.3, the sock, the outer boot, and the integrity cover shall have at least the following compliance statement on each component, and all letters shall be at least 2.5 mm ($\frac{3}{32}$ in.) high:

THIS [insert component name SOCK, OUTER BOOT, or INTEGRITY COVER], WHEN WORN WITH [insert other two components], MEETS THE HAZARDOUS MATERIALS AND CBRN FOOTWEAR REQUIREMENTS OF CLASS [insert 1, 2, 2R, 3, 3R, 4, 4R, or 5 here] of NFPA 1994, INCORPORATED IN THE 2022 EDITION OF NFPA 1990, FOR THE ABOVE NOTED CLASS.
DO NOT REMOVE THIS LABEL.

5.4.1.3 NFPA 1994-Specific Ensemble Optional Compliance Statements.

5.4.1.3.1 Where a protective ensemble meets the additional optional requirements for flash fire protection, the protective ensemble shall have the following additional compliance statement as part of the product label, and all letters shall be at least 2.5 mm ($\frac{3}{32}$ in.) high:

THIS ENSEMBLE HAS BEEN CERTIFIED FOR LIMITED
FLASH FIRE PROTECTION ESCAPE ONLY IN THE EVENT
OF A FLASH FIRE.
DO NOT REMOVE THIS LABEL.

5.4.1.3.2 Where the protective ensemble has also been evaluated to the optional stealth requirements, the protective ensemble shall have the following additional statement as part of the product label, and all letters shall be at least 2.5 mm ($\frac{3}{32}$ in.) high:

THIS ENSEMBLE HAS BEEN EVALUATED TO THE
OPTIONAL STEALTH REQUIREMENTS OF THIS STAND-
ARD. REFER TO THE TECHNICAL DATA PACKAGE FOR
SPECIFIC INFORMATION.
DO NOT REMOVE THIS LABEL.

5.4.1.4* Where detachable components of an ensemble or ensemble element must be worn with the ensemble or ensemble element in order to be compliant with this standard or any optional requirements of this standard, at least the following statement and information shall also be printed legibly on the product label of the ensemble element that requires an additional component with all letters at least 1.6 mm ($\frac{1}{16}$ in.) high and following the product compliance statement on the label, the appropriate term inserted where indicated, and the detachable component(s) listed by type, identification, and how properly worn:

FOR COMPLIANCE WITH NFPA 1994, THE FOLLOWING
ADDITIONAL COMPONENTS MUST BE WORN IN
CONJUNCTION WITH THIS HAZARDOUS MATERIALS
AND CBRN PROTECTIVE [insert the term ENSEMBLE or
ENSEMBLE ELEMENT here]:

[list detachable components here]

5.4.1.4.1 The manufacturer shall be permitted to list the detachable components in the technical data package by providing an additional statement on the label specified in 5.4.1.4 as follows:

SEE TECHNICAL DATA PACKAGE FOR A LIST OF DETACH-
ABLE COMPONENTS.

5.4.1.4.2 Detachable components specified in 5.4.1.4 shall meet the label requirements specified in ASTM F1301, *Standard Practice for Labeling Chemical Protective Clothing*, and the requirements of 5.1.1.1 through 5.1.1.5.

5.4.2 NFPA 1994-Specific User Information Requirements. (Reserved)

5.4.3 NFPA 1994-Specific Technical Data Package Requirements.

5.4.3.1* The manufacturer shall furnish a technical data package for the hazardous materials and CBRN protective ensemble and ensemble elements upon the request of the purchaser.

5.4.3.2* The technical data package shall contain all documentation required by this standard and the values obtained from the initial certification showing compliance with the requirements of Chapter 7 in the current edition of this standard using the reporting formats provided in Table 5.4.3.2(a) and Table 5.4.3.2(b) for each ensemble, ensemble element, material, or component, as applicable.

5.4.3.2.1 The technical data package information shall indicate “Pass” for those requirements where there is no quantitative value reported and “NR (No Requirement)” for specific requirements that do not apply to the protective ensemble.

5.4.3.2.2 The manufacturer shall be permitted to make modifications in the tabular format in order to accommodate specific product features or additional materials as applicable to the certified product.

5.4.3.3* In the technical data package, the manufacturer shall describe the hazardous materials and CBRN protective ensemble and ensemble elements in terms of manufacturer trade name, model number, manufacturer replaceable components, available options, accessories, testing devices, and sizes.

5.4.3.3.1 Descriptions of size shall include the range in height and weight for persons fitting each particular size (for ensembles) or sizes in accordance with Chapter 6 (for glove, hood, and footwear elements).

5.4.3.3.2 Descriptions also shall provide information to the wearer as to whether these sizes apply to persons wearing SCBA or other respirators, hard hats, communications devices, and other similar equipment.

5.4.3.4 NFPA 1994-Specific Garment Material and Component Descriptions.

5.4.3.4.1 Where specific clothing items and equipment are required for certifying hazardous materials and CBRN protective ensembles and ensemble elements as compliant to this standard, the manufacturer shall list these clothing items and equipment in the technical data package.

5.4.3.4.2 The manufacturer shall provide, in the technical data package, the list and descriptions of the following hazardous materials and CBRN protective ensemble materials and ensemble elements, where applicable:

- (1) Garment material
- (2) Visor material
- (3) Glove material and type of attachment
- (4) Footwear material and type of attachment
- (5) Hood material and type of attachment
- (6) Zipper/closure type and materials
- (7) Material seam types and composition
- (8) Exhaust valve type(s) and material(s)
- (9) External fitting type(s) and material(s)
- (10) External interface type(s) and material(s)
- (11) Outer garment, glove, or footwear material(s)
- (12) Manufacturer and specific model of respirator(s) tested with the ensemble
- (13) Type or style of head protection accommodated within the garment

5.4.3.4.3 All descriptions of material composition shall specify either the generic material names or, if the composition of the material is proprietary, trade names. For separate items or detachable components, the description shall also include the manufacturer and style or model number.