

NFPA®

1991

**Standard on Vapor-Protective
Ensembles for Hazardous Materials
Emergencies and CBRN Terrorism
Incidents**

2016



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NFPA®1991

Standard on

Vapor-Protective Ensembles for Hazardous Materials Emergencies and CBRN Terrorism Incidents

2016 Edition

This edition of NFPA 1991, *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies and CBRN Terrorism Incidents*, was prepared by the Technical Committee on Hazardous Materials 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 November 14, 2015, with an effective date of December 4, 2015, and supersedes all previous editions.

This edition of NFPA 1991 was approved as an American National Standard on December 4, 2015.

Origin and Development of NFPA 1991

In 1985, the National Transportation Safety Board (NTSB) issued Report I-004-5 on a hazardous material incident that occurred in Benicia, California. In that report, the NTSB recommended that standards be developed for protective clothing for protection from hazardous chemicals. The U.S. Department of Transportation (DOT) issued a position that requested private sector standards development to undertake the project of writing the standards on hazardous chemical protective clothing and asked other governmental agencies to assist and participate in the private sector standards development system. DOT time also directly requested that the NFPA develop documents on hazardous chemical protective clothing. The Environmental Protection Agency (EPA), the U.S. Coast Guard (USCG), the Federal Emergency Management Agency (FEMA), and the Occupational Safety and Health Administration (OSHA) either adopted position statements modeled after the DOT position or endorsed the DOT position.

During 1985, the NFPA Standards Council approved a project for development of those standards and assigned the project to the Technical Committee on Fire Service Protective Clothing and Equipment. The Technical Committee established a standing Subcommittee on Hazardous Chemicals Protective Clothing, which began work in Phoenix, Arizona, in March 1986. Representatives from the USCG, FEMA, and OSHA participated on the subcommittee.

At the same time, the American Society for Testing and Materials (now ASTM International) was developing a document on a selection of chemicals for evaluating protective clothing materials that would serve as one of several ASTM testing criteria that would be referenced in the NFPA standards.

The subcommittee met several times over a 2½-year period at different locations across the country and developed two standards, one for vapor-protection and one for liquid-splash protection. NFPA 1991 addresses vapor-protective ensembles designed to protect emergency response personnel against exposure to specified chemicals in vapor and liquid-splash environments during hazardous materials emergencies. Chemical permeation resistance documentation is required for primary suit materials (garment, visor, gloves, and boots) against each chemical in the NFPA battery of chemicals and any additional chemicals or specific chemical mixtures for which the manufacturer is certifying the suit. The NFPA battery of chemicals consists of 21 chemicals, as specified in ASTM F1001, *Standard Guide for Selection of Chemicals to Evaluate Protective Clothing Materials*. These chemicals were selected because they are representative of the classes of chemicals that are encountered during hazardous chemical emergencies.

NFPA 1991 includes performance requirements that were established to reflect simulated use conditions. A suit pressurization test is used to check the airtight integrity of each protective suit. Also, an overall suit water penetration test is designed to ensure the suit provides full body protection against liquid splashes. Primary suit materials must resist permeation for 1 hour or more by each chemical in the NFPA battery. Manufacturers can certify protective suits for additional chemicals if

the same permeation performance is met. Also included are penetration resistance testing of closures and leak and cracking pressure tests for exhaust valves.

These tests allow determination of adequate suit component performance in hazardous chemical environments.

Material testing for burst strength, tear strength, abrasion resistance, flammability resistance, cold temperature performance, and flexural fatigue are required so that materials used for vapor-protective suits will afford adequate protection in the environment in which they will be used.

The first edition of NFPA 1991 was voted on by the Association at the 1989 Fall Meeting in Seattle, Washington, on November 15, 1989, and had an effective date of February 5, 1990.

The Subcommittee on Hazardous Chemicals Protective Clothing began an early revision (4-year cycle) of the 1990 edition of NFPA 1991 in December 1991. During 1993, the NFPA restructured the manner in which committees were organized, and all standing subcommittees were eliminated. Within the Technical Committee on Fire Service Protective Clothing and Equipment, the former standing subcommittees were reorganized as task groups to address specific technical issues, and the technical committee assumed the entire responsibility for NFPA 1991.

The second edition of NFPA 1991 encompassed revised scope and purpose sections to include optional components for enhanced protection and replacement items. Test methods were updated and refined to better ensure repeatability of testing results. Extensive changes were made to the product labels to better accommodate the optional and replacement items.

The second edition was acted on by the membership of the Association at the NFPA Annual Meeting in San Francisco, California, on May 18, 1994, and was issued with an effective date of August 5, 1994.

In January 1995, the entire project for fire service protective clothing and equipment was reorganized by the Standards Council. The new project has a Technical Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment and seven technical committees operating within the project. The former standing Subcommittee on Hazardous Chemicals Protective Clothing was established as the new Technical Committee on Hazardous Materials Protective Clothing and Equipment and has the responsibility for NFPA 1991.

The third edition, with the new title of *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies*, represented a complete revision of the second edition and addressed the protection as an ensemble rather than as separate items, but it did provide for replacement elements for gloves and footwear. The third edition was presented to the Association membership at the 1999 November Meeting in New Orleans, Louisiana, on November 17, 1999, and was issued by the Standards Council with an effective date of February 11, 2000.

The 2005 edition (the fourth edition) was a complete revision of NFPA 1991 and was reformatted according to the new style for all NFPA codes and standards. As a result, chapter titles and numbering, as well as paragraph numbering, were changed. While the 2005 edition's content was in a different order than in previous editions, all the material remained. The Committee included in Chapter 4 new requirements for manufacturers' quality assurance programs, and for situations in which hazards involving compliant products are believed to exist, including the appropriate actions in addressing those situations if there is a previously unknown threat to the users. These new requirements apply to all fire and emergency services product standards that are the responsibility of this Project. The formerly optional requirements for protection from chemical and biological terrorism agents are no longer optional and were incorporated into the base requirements for all vapor-protective ensembles. The change provided this additional protection from CBR(N) exposures for the hazardous materials protective ensemble that offers the highest level of protection for emergency responders: the vapor-protective ensemble.

The other two optional requirements, chemical flash fire protection for escape only and liquefied gas protection, remained as optional features that purchasers can specify in purchase specifications. All labeling, design, performance, and testing requirements were reviewed and refined as necessary.

The Technical Committee finished its work on the fifth edition of NFPA 1991 with a complete revision in 2015. A relatively long interval between the fourth and fifth editions occurred due to the Technical Committee's attempts to investigate and transition the permeation resistance requirements for ensemble materials (suit, visor, gloves, footwear, and seams) to a new test method in which the cumulative permeation mass replaced the use of breakthrough time as the basis of acceptable material performance. Cumulative permeation mass is the total amount of chemical that permeates through the chemical in 1 hour. In contrast, breakthrough time was defined as the elapsed time that occurs before the rate of permeation through the material is equal to $0.1 \mu\text{m}/\text{cm}^2 \cdot \text{min}$. The Technical Committee adopted material permeation resistance criteria on the basis of cumulative permeation mass because this measurement was considered to be more repeatable and meaningful in terms of end user exposure. Extensive research supported this change. The Technical Committee further identified a number of other priorities for modification of NFPA 1991 through a comprehensive survey to industry end users to either improve current criteria or address unmet needs. Other changes in the 2016 edition include the following:

- (1) A title change to include CBRN terrorism incidents, based on the transfer of Class 1 requirements from NFPA 2001 and the reorganization of NFPA 1994.

- (2) A mandatory requirement for encapsulation of the wearers and their breathing apparatus has been affirmed based on the anticipation of non-encapsulating requirements being included as new set of Class 1 criteria in NFPA 1994.
- (3) Overcovers and detachable visor materials are no longer permitted for achieving certification for base ensemble criteria.
- (4) Tape is prohibited from being used to secure or seam components of the ensemble.
- (5) Protective covers are required to protect the suit closure.
- (6) A vapor inward leakage test using sulfur hexafluoride has been replaced with the Man-in-Simulant Test (MIST) performed at a higher concentration.
- (7) Some changes have been made in the chemical battery, with acrolein and acrylonitrile replacing cyanogen chloride, hydrogen cyanide, and phosgene as more relevant skin toxic chemicals; more persistent chemical warfare agent Soman (GD) has replaced Sarin (GB).
- (8) An impact resistance requirement for the visor has replaced burst and puncture/tear testing of visor materials.
- (9) A field of vision assessment has been added to the evaluation of the ensemble.
- (10) A maximum time has been set for individual wearers to be able to remove and reinsert their hands into the ensemble glove system.
- (11) Improvements have been made to the flame resistance test and its interpretation.
- (12) Several test methods for glove and footwear test methods and criteria have been updated.
- (13) Modifications have been made to increase the repeatability of the flash fire test.
- (14) The shelf life of the ensemble is required to be reported.

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2016 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. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex B. 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 publications can be found in Chapter 2 and Annex B.

Chapter 1 Administration

1.1* Scope.

1.1.1* This standard shall specify minimum requirements for the design, performance, testing, documentation, and certification of vapor-protective ensembles and ensemble elements used by emergency response personnel during hazardous materials incidents and for protection from chemicals, biological agents, and radiological particulates (CBRN) encountered as terrorism agents.

1.1.2* This standard shall also specify additional *optional* criteria for vapor-protective ensembles that provide escape protec-

tion from chemical flash fires encountered during hazardous materials incidents.

1.1.3 This standard shall specify requirements for new vapor-protective ensembles and new ensemble elements.

1.1.4 This standard alone shall not specify requirements for protective clothing for any fire fighting applications.

1.1.5 This standard alone shall not specify requirements for protection against ionizing radiation, cryogenic liquid hazards, or explosive atmospheres.

1.1.6* This standard shall not specify requirements for the respiratory protection that is necessary for proper protection with the protective ensemble. Respiratory protection for hazardous materials emergencies and CBRN terrorism incidents is a critical part of the overall protection and shall be specified by the authority having jurisdiction.

1.1.7 Certification of compliant vapor-protective ensembles and compliant 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 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.

1.1.9 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 response personnel against adverse vapor, liquid-splash, and particulate environments during hazardous materials incidents, and from specified chemical and biological terrorism agents in vapor, liquid splash, and particulate environments during CBRN terrorism incidents.

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

1.2.1.2 The purpose of this standard shall also be to establish a minimum level of *limited* chemical flash fire protection, *for escape only* in the event of a chemical flash fire, as an option for compliant vapor-protective ensembles and compliant ensemble elements.

1.2.1.3 The purpose of these options shall be to provide emergency response organizations the flexibility to specify neither, one, or both of these options in their purchase specifications according to the anticipated exposure and expected needs of the emergency response organization.

1.2.2* 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.

1.2.3 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.

1.3 Application.

1.3.1 This standard shall apply to the design, manufacturing, testing, documentation and certification of new vapor-protective ensembles and new ensemble elements. This edition of NFPA 1991 shall not apply to vapor-protective ensembles and ensemble elements manufactured to previous editions of NFPA 1991.

1.3.2* This standard alone shall not apply to protective clothing for any fire-fighting applications.

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

1.3.4 This standard shall not apply to use requirements for vapor-protective ensembles or ensemble elements as these requirements are specified in NFPA 1500.

1.3.5* 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.

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

1.4* Units.

1.4.1 In this standard, values for measurement are followed by an equivalent in parentheses, but only the first stated value shall be regarded as the requirement.

1.4.2 Equivalent values in parentheses shall not be considered as the requirement as these values are approximate.

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*, 2012 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, 2013 edition.

NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, 2013 edition.

2.3 Other Publications.

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

ANSI Z87.1, *American National Standard for Occupational and Educational Eye and Face Protection*, 2010.

ANSI Z89.1, *Standard for Industrial Head Protection*, 2009.

2.3.2 ASTM Publications. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D747, *Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam*, 2009.

ASTM D751, *Standard Test Methods for Coated Fabrics*, 2006 (2011).

ASTM D1776, *Standard Practice for Conditioning and Testing Textiles*, 2008e1.

ASTM D2136, *Standard Test Method for Coated Fabrics — Low Temperature Bend Test*, 2012.

ASTM D2582, *Standard Test Method for Puncture Propagation Tear Resistance of Plastic Film and Thin Sheet*, 2009.

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

ASTM D6413, *Standard Test Method for Flame Resistance of Textiles (Vertical Test)*, 2013b.

ASTM F392, *Standard Test Method for Flex Durability of Flexible Barrier Materials*, 2011.

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

ASTM F903, *Standard Test Method for Resistance of Materials Used in Protective Clothing to Prevent Penetration by Liquids*, 2010.

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

ASTM F1052, *Standard Test Method for Pressure Testing of Vapor-Protective Ensembles*, 2009.

ASTM F1154, *Standard Practices for Qualitatively Evaluating the Comfort, Fit, Function, and Durability of Protective Ensembles and Ensemble Components*, 2011.

ASTM F1301, *Standard Practice for Labeling Chemical Protective Clothing*, 2011e1.

ASTM F1342, *Standard Test Method for Resistance of Protective Clothing Materials to Puncture*, 2005 (2013) e1.

ASTM F1358, *Standard Test Method for Effects of Flame Impingement on Materials Used in Protective Clothing Not Designated Primarily for Flame Resistance*, 2008.

ASTM F1359, *Standard Test Method for Liquid Penetration Resistance of Protective Clothing or Protective Ensembles Under a Shower Spray While on a Mannequin*, 2013.

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

ASTM F1930, *Standard Test Method for Evaluation of Flame Resistant Clothing for Protection Against Fire Simulations Using an Instrumented Manikin*, 2013.

ASTM F2010, *Standard Test Method for Evaluation of Glove Effects on Wearer Hand Dexterity Using a Modified Pegboard Test*, 2010.

ASTM F2412, *Standard Test Methods for Foot Protection*, 2011.

ASTM F2413, *Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear*, 2011.

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

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*, 2011.

2.3.3 FIA Publications. Footwear Industries of America, 1420 K Street, NW, Washington, DC 20005.

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

2.3.4 ISO Publications. International Organization for Standardization, 1, rue de Varembe, Case postale 56, CH-1211 Geneve 20, Switzerland.

ISO 27, *Guidelines for corrective action to be taken by a certification body in the event of misuse of its mark of conformity*, 1983.

ISO 4649, *Rubber, vulcanized or thermoplastic — Determination of abrasion resistance using a rotating cylindrical drum device*, 2010.

ISO 9001, *Quality management systems — Requirements*, 2008.

ISO 17011, *Conformity assessment — General requirements for accreditation bodies accrediting conformity assessment bodies*, 2004.

ISO 17021, *Conformity assessment — Requirements for bodies providing audit and certification of management systems*, 2011.

ISO 17025, *General requirements for the competence of testing and calibration laboratories*, 2005.

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

2.3.5 U.S. Government Publications. U.S. Government Publishing Office, Washington, DC 20402.

Title 29, Code of Federal Regulations, Part 1910.132, "Personal Protective Equipment," 1994.

2.3.6 Other Publications.

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

Assessment of the U.S. Army Chemical And Biological Defense Command Report 1: Technical Assessment of the Man-In-Simulant Test (MIST) Program, National Research Council Report, The National Academies, 500 Fifth St. N.W., Washington, D.C. 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.

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

3.3.2 Agents.

3.3.2.1 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.

3.3.2.2 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 3.3.2.1, 3.3.2.3, and 3.3.2.5.)

3.3.2.3 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.

3.3.2.4* 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 3.3.2.3 and 3.3.2.6.)

3.3.2.5 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.

3.3.2.6 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 3.3.2.3 and 3.3.2.4.)

3.3.3 Boot. See 3.3.68.

3.3.4 Bootie. A sock-like extension of the garment or suit leg that covers the entire foot.

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

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

3.3.7 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.

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

3.3.9 Chemical and Biological Terrorism Incidents. Situations involving the release of chemical or biological warfare agents in civilian areas by terrorists.

3.3.10 Chemical and Biological Terrorism Vapor-Protective Ensemble. See 3.3.64.

3.3.11* 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.

3.3.12 Chemical-Protective Elements. See 3.3.24.

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

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

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

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

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

3.3.18 Cracking Pressure. The pressure at which the suit exhaust valve begins to open, releasing exhaust air to the outside suit environment.

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

3.3.20 Element(s). See 3.3.24.

3.3.21 Emergency Response Personnel. Personnel assigned to organizations that have the responsibility for responding to hazardous materials emergencies.

3.3.22 Encapsulating. A type of ensemble that provides vapor- or gastight protection, or liquidtight protection, or both, and completely covers the wearer and the wearer's respiratory equipment.

3.3.23 Ensemble. See 3.3.64.

3.3.24* Ensemble Elements. The compliant products that provide protection to the upper and lower torso, arms, legs, head, hands, and feet.

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

3.3.26* 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.

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

3.3.28 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.

3.3.29 Footwear. See 3.3.68.

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

3.3.31 Garment. See 3.3.70.

3.3.32 Glove. See 3.3.69.

3.3.33* Hazardous Materials. A substance (solid, liquid, or gas) that when released is capable of creating harm to people, the environment, and property.

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

3.3.35 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.

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

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

3.3.38 Liquid Splash-Protective Ensemble. Multiple elements of compliant protective clothing and equipment products that when worn together provide protection from some risks, but not all risks, of hazardous materials emergency incident operations involving liquids.

3.3.39 Maintenance. Procedures for inspection, repair, and removal from service of vapor-protective ensembles.

3.3.40 Manufacturer. The entity that directs and controls compliant product design, compliant product manufacturing, or compliant product quality assurance; also, the entity that assumes the liability for the compliant product or provides the warranty for the compliant product.

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

3.3.42 Model. The collective term used to identify a group of individual vapor-protective ensembles or elements of the same basic design and components from a single manufacturer produced by the same manufacturing and quality assurance procedures that are covered by the same certification.

3.3.43 Outer Boot. A secondary boot worn over the footwear ensemble element or bootie for the purpose of providing physical protection in order to meet the requirements of this standard.

3.3.44 Outer Garment. A secondary garment worn over the suit ensemble element for the purpose of providing physical protection in order to meet the requirements of this standard.

3.3.45 Outer Glove. A secondary glove worn over the glove ensemble element for the purpose of providing physical protection in order to meet the requirements of this standard.

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

3.3.47* Primary Materials. Vapor-protective ensemble and element materials limited to the suit material, hood and visor material, glove material, and footwear material that provide protection from chemical and physical hazards.

3.3.48 Product Label. A label or marking affixed to each compliant vapor-protective ensemble and compliant ensemble element by the manufacturer. Such labels contain compliance statements, certification statements, general information, care, maintenance, or similar 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.

3.3.49 Protective Ensemble. See 3.3.64.

3.3.50 Protective Footwear. See 3.3.68.

3.3.51 Protective Glove. See 3.3.69.

3.3.52 Protective Suit. See 3.3.70.

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

3.3.54 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.

3.3.55 Respiratory Equipment. A positive-pressure, self-contained breathing apparatus (SCBA) or combination SCBA/supplied-air breathing apparatus.

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

3.3.57 Seam. Any permanent attachment of two or more chemical-protective clothing materials, excluding external fittings, gaskets, and suit closure assemblies, in a line formed by joining the separate material pieces.

3.3.58 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.

3.3.59 Storage Life. The date to remove from service a vapor-protective ensemble or individual 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.

3.3.60 Suit. See 3.3.70.

3.3.61 Suit Closure. The component that allows the wearer to enter (don) and exit (doff) the vapor-protective suit element.

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

3.3.63 Suit Material. The principal material used in the construction of the vapor-protective suit.

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

3.3.65 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.

3.3.66* 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*.

3.3.67* 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.

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

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

3.3.70* Vapor-Protective Suit. The ensemble garment element of the protective ensemble that provides chemical protection to the upper and lower torso, head, arms, and legs.

3.3.71 Visor Material. The transparent chemical-protective material that allows the wearer to see outside the protective ensemble hood.

Chapter 4 Certification

4.1 General.

4.1.1 The process of certification for protective ensembles and ensemble elements as being compliant with NFPA 1991 shall meet the requirements of Section 4.1 through Section 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 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 17011, *Conformity assessment — General requirements for accreditation bodies accrediting conformity assessment bodies*.

4.1.4* Manufacturers shall not claim compliance with portions or segments of the requirements of this standard and shall not use the NFPA name or the name or identification of this standard, NFPA 1991, in any statements about their respective product(s) unless the product(s) is certified as compliant to this standard.

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

4.1.6 All compliant ensembles and ensemble elements shall also have a product label that meets the requirements specified in Section 5.1.

4.1.7* The certification organization's label, symbol, or identifying mark shall be attached to the product label, or 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 to the 2005 edition of this standard on or after the NFPA effective date for the 2016 edition, which is December 4, 2015.

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 2005 edition of this standard on or after December 4, 2016.

4.1.10 The certification organization shall require manufacturers to remove all certification labels and product labels indicating compliance with the 2005 edition of this standard from all ensembles and ensemble elements that are under the control of the manufacturer on December 4, 2016, and the certification organization shall verify this action is taken.

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, *Conformity assessment — Requirements*, for bodies certifying products, processes and services. The accreditation shall be issued by an accreditation body operating in accordance with ISO 17011, *Conformity assessment — General requirements for accreditation bodies accrediting conformity assessment bodies*.

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

4.2.6* The certification organization shall have or 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 calibration of all instruments, and procedures shall be in use 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 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 the compliant product to determine its continued certification to this standard.

4.2.9* The certification organization shall have a follow-up inspection program of the manufacturer's facilities of the compliant product with at least two random and unannounced visits per 12-month period to verify the product's continued compliance.

4.2.9.1 As part of the follow-up inspection program, the certification organization shall select sample compliant product at random from the manufacturer's production line, from the manufacturer'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 in order to assure that the materials, components, and manufacturing quality assurance systems are consistent with the materials, components, and manufacturing quality assurance that were inspected and tested by the certification organization during initial certification and recertification.

4.2.9.3 The certification organization shall be permitted to conduct specific testing to verify the 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 acquired in accordance with 4.2.9.1 against the applicable requirements of this standard.

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

4.2.11 The certification organization's operating procedures shall provide 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 recertification shall be conducted by a certification organization's testing laboratory that is accredited in accordance with the requirements of ISO 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 17025, *General requirements for the competence of testing and calibration laboratories*, 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 17011, *Conformity assessment — General requirements for accreditation bodies accrediting conformity assessment bodies*.

4.3.3 A certification organization shall be permitted to utilize conditioning and testing results conducted by a product or component manufacturer for certification or recertification 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 17025, *General requirements for the competence of testing and calibration laboratories*.

4.3.3.2 The manufacturer's testing laboratory's scope of accreditation to ISO 17025, *General requirements for the competence of testing and calibration laboratories*, 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 17011, *Conformity assessment — General requirements for accreditation bodies accrediting conformity assessment bodies*.

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 for certification or recertification 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 a 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. This information shall be included in the manufacturer's technical data package.

4.3.5 Inspection by the certification organization shall include a review of all product labels to ensure that all required label attachments, compliance statements, certification statements, and other product information are at least as specified for the ensemble and ensemble elements in Section 5.1.

4.3.6 Inspection by the certification organization shall include an evaluation of any symbols and pictorial graphic representations used on product labels or in user information, as permit-

ted by 5.1.1.5, to ensure that the symbols 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 Section 5.2 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 requirements of Section 5.3.

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

4.3.10 Testing to determine product compliance with the 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 ensemble and ensemble element.

4.3.10.2 The certification organization also shall 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 to the actual final product or product component.

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 in 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 compliance to all 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 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 of Vapor-Protective Ensembles*. 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 5.1.1.8(5). The manufacturer shall provide the result with each ensemble.

4.4 Annual Verification of Product Compliance.

4.4.1 All vapor-protective ensemble models and all individual element models that are labeled as being compliant with this standard shall undergo recertification on an annual basis. This recertification shall include inspection and evaluation to all design requirements and testing to all performance requirements as required by this standard on all manufacturer's models and components as required by 4.4.3.

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

4.4.1.2 For the purpose of this standard, models shall include each unique pattern, style, or design of the individual element.

4.4.2 Samples of manufacturer's models and components for recertification shall be acquired from the manufacturer or component supplier during random and unannounced visits as part of the follow-up inspection program. For recertification, the certification organization shall acquire at least one complete vapor-protective ensemble sample outfitted with all manufacturer-provided external fittings. The certification organization shall also acquire a sufficient quantity of component samples to be tested for recertification as required by 4.4.3.

4.4.3 Sample vapor-protective ensembles and components shall be inspected, evaluated, and tested as follows.

4.4.3.1 Each vapor-protective ensemble shall be inspected and evaluated to each of the design requirements specified in Chapter 6.

4.4.3.2 A single specimen of each vapor-protective ensemble shall be tested for overall performance as specified in Section 7.1 using the following sequence of tests:

- (1) The vapor-protective ensemble specimen shall be tested for gastight integrity in accordance with Section 8.2.
- (2) The vapor-protective ensemble specimen shall then be tested for liquidtight integrity as specified in Section 8.3.
- (3) The vapor-protective ensemble specimen shall then be tested for overall function and integrity as specified in Section 8.4.
- (4) The vapor-protective ensemble specimen shall then be tested for airflow capacity as specified in Section 8.5.
- (5) A new vapor-protective ensemble specimen shall be tested for overall inward leakage as specified in Section 8.8.
- (6) If certified for optional chemical flash fire protection as specified in Section 7.7, a new vapor-protective ensemble specimen shall then be tested for overall ensemble flash protection as specified in Section 8.25.

4.4.3.3 All suit, visor, glove, footwear, optional chemical flash fire protection, and optional liquefied gas protection performance requirements shall be evaluated as specified in Chapter 7 with the following modifications:

- (1) Chemical permeation and chemical penetration resistance testing shall be limited to the testing specified in 7.2.1, 7.3.1, 7.4.1, and 7.5.1 and shall be limited to the following chemicals:
 - (a) Acrylonitrile
 - (b) Carbon disulfide
 - (c) Dichloromethane
 - (d) Diethylamine
 - (e) Methanol
 - (f) Tetrahydrofuran
- (2) Chemical permeation resistance testing specified in 7.6.2 shall be limited to ammonia.
- (3) If the number of specimens is greater than two in the initial testing, a total of two specimens shall be permitted for annual testing requirements.
- (4) If testing is specified for both directions of a material, a total of two specimens per material direction shall be permitted for testing requirements.

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

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 assure production remains in compliance.

4.5.3* The manufacturer shall be registered to ISO 9001, *Quality management systems — Requirements*.

4.5.3.1 Registration to the requirements of ISO 9001, *Quality management systems — Requirements*, shall be conducted by a registrar that is accredited for personal protective equipment in accordance with ISO 17021, *Conformity assessment — Requirements for bodies providing audit and certification of management systems*.

4.5.3.2 The scope of the ISO registration shall include at least the design and manufacturing systems management for the personal protective equipment being certified.

4.5.3.3 The registrar shall affix the accreditation mark on the ISO registration certificate.

4.5.4* Any entity that meets the definition of *manufacturer* as specified in 3.3.44 and therefore is considered to be the "manufacturer," but does not manufacture or assemble the compliant product, shall meet the requirements specified in Section 4.5.

4.5.5* Where the manufacturer uses subcontractors in the construction or assembly of the compliant product, the locations and names of all subcontractor facilities shall be docu-

mented 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 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 involved with 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 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 involved with a compliant product, the certification organization shall determine the scope of the hazard including 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 product 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 compliant product is gaining widespread use in applications not foreseen when the standard was written, such applications in turn being ones for which the product was not certified, and no specific scope of application has been provided in the standard, and no limiting scope of application was 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 the manufacturer of the compliant 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 the 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 the 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, the certification organization shall notify relevant governmental and regulatory agencies and issue 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 indicated, 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 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, *Quality management systems — Requirements*, or an equivalent ISO quality management system for investigating written complaints and returned products. (See also A.4.5.3.)

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 can 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 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 follow-

ing 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 the 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 Product Label Requirements.

5.1.1 General.

5.1.1.1 Each vapor protective ensemble shall have a product label permanently and conspicuously attached to the innermost surface of the ensemble when the ensemble is properly assembled with all layers, components, and parts in place.

5.1.1.2 Each glove and footwear element shall have a product label attached to the element, or printed upon or inserted in the smallest unit of packaging of that element.

5.1.1.3 Multiple label pieces shall be permitted in order to carry all statements and information required to be on the product label; however, all label pieces comprising the entire product label shall be located adjacent to each other.

5.1.1.4 All worded portions of the required product label shall at least be in English.

5.1.1.5 Symbols and other pictorial graphic representations shall be permitted to be used to supplement worded statements on the product label(s) where such symbols and other pictorial graphic representations are clearly explained in the user information.

5.1.1.6 The certification organization's label, symbol, or identifying mark shall be legibly printed on the product label. All letters shall be at least 2.5 mm ($\frac{3}{32}$ in.) high.

5.1.1.7 The compliance statements and information specified in 5.1.2 and 5.1.3, as applicable for the specific ensemble or ensemble element, shall be legibly printed on the product label. All letters shall be at least 3 mm ($\frac{1}{8}$ in.) high.

5.1.1.8 In addition to the compliance statements and information specified in 5.1.1.6, at least the following information shall also be printed legibly on the product label(s). All letters shall be at least 2 mm ($\frac{1}{16}$ in.) high.

- (1) Manufacturer's name, identification, or designation
- (2) Manufacturer's address
- (3) Country of manufacture
- (4) Suit model, style, or serial number
- (5) Date of compliance testing to ASTM F1052, *Standard Test Method for Pressure Testing of Vapor-Protective Ensembles*
- (6) Size
- (7) Suit, glove, footwear material(s), as applicable
- (8) Visor material(s) for suits
- (9) Glove component for ensemble
- (10) Footwear component for ensemble

5.1.1.9 Where detachable components of a vapor-protective ensemble element, including but not limited to, such components as supplemental garments, gloves, or boots, must be worn with a vapor-protective ensemble element in order to be compliant with the 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. All letters shall be at least 2.5 mm ($\frac{3}{32}$ in.) high. The appropriate term ensemble or element shall be inserted where indicated in the label text. The statement shall be followed by the detachable component(s) type and, identification and instructions for proper wear.

“FOR COMPLIANCE WITH NFPA 1991, AND (insert ‘OPTIONAL LIMITED CHEMICAL FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A CHEMICAL FLASH FIRE’ or ‘LIQUEFIED GAS PROTECTION’ or both), THE FOLLOWING COMPONENTS MUST BE WORN IN CONJUNCTION WITH THIS VAPOR-PROTECTIVE (insert the term ENSEMBLE or ENSEMBLE ELEMENT here):
(List detachable components here.)”

5.1.1.10 Detachable components specified in 5.1.1.9 shall meet the label requirements specified in ASTM F1301, *Standard Practice for Labeling Chemical Protective Clothing*. The label shall also meet the requirements of 5.1.1 through 5.1.1.5.

5.1.2 Ensemble Compliance Statements.

5.1.2.1 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, STANDARD ON VAPOR-PROTECTIVE ENSEMBLES FOR HAZARDOUS MATERIALS EMERGENCIES, 2016 EDITION, AND ANY ADDITIONAL REQUIREMENTS NOTED 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 CHEMICAL FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A CHEMICAL FLASH FIRE		
LIQUEFIED GAS PROTECTION		

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

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

5.1.3 Ensemble Element Compliance Statements.

5.1.3.1 Each ensemble element shall have at least the following compliance statement and information on the product label. The appropriate term “glove” or “footwear” shall be inserted where indicated in the label text.

“THIS (insert the element name ‘GLOVE’ or ‘FOOTWEAR’ here) ELEMENT MEETS THE REQUIREMENTS OF NFPA 1991, STANDARD ON VAPOR-PROTECTIVE ENSEMBLES FOR HAZARDOUS MATERIALS EMERGENCIES, 2016 EDITION, AND ANY ADDITIONAL REQUIREMENTS AS NOTED 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 CHEMICAL FLASH FIRE PROTECTION FOR ESCAPE ONLY IN THE EVENT OF A CHEMICAL FLASH FIRE		
LIQUEFIED GAS PROTECTION		

5.1.3.2 Where the ensemble element provides one or both optional additional protection, the YES or NO box shall be marked as appropriate for the additional requirement.

5.1.3.3 Where the ensemble element does not provide any optional additional protection above the basic requirements of this standard, the NO boxes shall be marked for both additional requirements.

5.2* User Information.

5.2.1 The manufacturer shall provide user information including, but not limited to, warnings, information, and instructions with each vapor-protective ensemble and each element.

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

5.2.3 The required user information, or packaging containing the user information, shall be attached to the vapor-protective ensemble or ensemble element so 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.

5.2.4 The manufacturer shall provide at least the following instructions and information with each vapor-protective ensemble and each element:

- (1) Pre-use information as follows:
 - (a) Safety considerations
 - (b) Limitations of use
 - (c) Marking recommendations and restrictions

- (d) A statement that most performance properties of the vapor-protective ensemble or ensemble element cannot be tested by the user in the field
- (e) Closure lubricants, if applicable
- (f) Suit visor antifog agents or procedures
- (g) Recommended undergarments
- (h) Storage life and storage conditions
- (i) Warranty information
- (2) Preparation for use as follows:
 - (a) Sizing/adjustment
 - (b) Recommended storage practices
- (3) Inspection frequency and details
- (4) Don/doff information as follows:
 - (a) Donning and doffing procedures
 - (b) Sizing and adjustment procedures
- (5) Procedures for completing interfaces with detachable components, including but not limited to detachable gloves, detachable boots, and detachable overcovers
- (6) Proper use consistent with NFPA 1500 and 29 CFR 1910.132
- (7) Maintenance and cleaning information as follows:
 - (a) Cleaning instructions and precautions with a statement advising users not to use garments that are not thoroughly cleaned and dried
 - (b) Inspection details
 - (c) Maintenance criteria and methods of repair, where applicable
 - (d) Decontamination procedures for both chemical and biological contamination
- (8) Retirement and disposal criteria and consideration
- (9) Instructions for removal and reinsertion of hand from gloves
- (10) Instructions for removal and replacement of gloves and other user-replaceable components
- (11)* A statement that "The closure has not been tested for permeation resistance."

5.2.4.1 The storage life shall be stated in years following the date of manufacture, and the rationale for this determination shall be provided.

5.2.5* Vapor-protective ensemble and ensemble element manufacturers shall furnish a log book with each ensemble and element along with instructions on the log book's proper completion and maintenance.

5.2.6 The manufacturer shall state the storage life for each vapor-protective ensemble and each element.

5.2.7* The manufacturer shall state the model(s) and cylinder(s) size of NFPA 1981-compliant open-circuit SCBA worn during certification of the garment.

5.3 Technical Data Package.

5.3.1 General.

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

5.3.1.2* 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 5.3.1.2(a) and Table 5.3.1.2(b). The technical data package information shall indicate "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.

5.3.1.3 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.

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

5.3.2 Material and Component Descriptions.

5.3.2.1 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.

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

- (1) Suit 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 types and material(s)
- (8) External fitting types and material(s)
- (9) External gasket types and material(s)
- (10) Outer suit, glove, or boot material(s)
- (11) Type or style of head protection accommodated within the suit

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