

NFPA 1992

Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies

2005 Edition



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An International Codes and Standards Organization

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NFPA 1992

Standard on

Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies

2005 Edition

This edition of NFPA 1992, *Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies*, was prepared by the Technical Committee on Hazardous Materials Protective Clothing and Equipment, released by the Technical Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment, and acted on by NFPA at its November Association Technical Meeting held November 13–17, 2004, in Miami Beach, FL. It was issued by the Standards Council on January 14, 2005, with an effective date of February 7, 2005, and supersedes all previous editions.

This edition of NFPA 1992 was approved as an American National Standard on February 7, 2005.

Origin and Development of NFPA 1992

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 United States 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 at this time also directly requested that the NFPA develop documents on hazardous chemical protective clothing. The Environmental Protection Agency (EPA), the United States 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 these standards and assigned the project to the Technical Committee on Fire Service Protective Clothing and Equipment. The Technical Committee on Fire Service Protective Clothing and Equipment established a standing Subcommittee on Hazardous Chemicals Protective Clothing, and they began their work in Phoenix, Arizona, in March 1986. Representatives from the USCG, FEMA, and OSHA participated on the subcommittee.

At the same time, ASTM 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-protective protection and one for liquid splash-protective 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: those specified in ASTM F 1001, *Standard Guide for 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.

The standard 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 when 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 where they will be used.

NFPA 1992 addresses liquid splash-protective ensembles and clothing designed to protect emergency response personnel against exposure to specified chemicals in liquid splash environments during hazardous materials emergencies. Chemical penetration resistance documentation of garment material against an NFPA battery of test chemicals and any additional chemicals or specific chemical mixtures for which the manufacturer is certifying the suit is required. The NFPA battery of chemicals were selected from ASTM F 1001, *Standard Guide for Chemicals to Evaluate Protective Clothing Materials*. These do not include liquid chemicals with known or suspected carcinogenicity or skin toxicity because these garments deal with skin exposure and not inhalation. This criterion produces a different subset of ASTM F 1001 chemicals to be certified.

The standard includes performance requirements that were established to reflect simulated use conditions. An overall suit water penetration test is included to ensure the suit provides full body splash protection. Materials testing includes burst strength, tear resistance, flammability resistance testing, abrasion resistance, cold temperature performance, and flexural fatigue testing. These tests are required so that garment materials will provide adequate protection in the environment in which they will be used.

The first edition of NFPA 1992 was voted on by the Association at the 1989 Fall Meeting in Seattle, WA, 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 1992 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 1992.

The second edition of NFPA 1992 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, CA, on May 18, 1994, and was issued with an effective date of August 5, 1994.

Since the second edition, the entire project for fire service protective clothing and equipment was reorganized, in January 1995, 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 1992.

The third edition had a title change to *Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies*, and was a complete revision to the second edition. It addressed the protection as an ensemble in addition to individual items of protective clothing. It also combined certain requirements for liquid-splash protection for support function activities from the former NFPA 1993, *Standard on Support Function Protective Clothing for Hazardous Chemical Operations*, the 1994 edition, which was withdrawn on January 14, 2000. Protective clothing certified as compliant with NFPA 1993 was seldom used by hazardous materials incident responders. More practical requirements for liquid splash-protective ensembles and clothing used for response and support activities were included in this edition of NFPA 1992.

The third edition was presented to the Association membership at the 1999 November Meeting in New Orleans, LA, on November 17, 1999, and issued by the Standards Council with an effective date of February 11, 2000.

This 2005 edition (fourth edition) of NFPA 1992 is once again a complete revision and is now reformatted according to the new style for all NFPA codes and standards. Because of the new style, most of the chapter numbering, as well as paragraph numbering, has changed. While this edition's content is in a different order than in previous editions, all the material is here, and the table of contents will quickly direct users of the document to the appropriate chapters and sections. The Committee has included in Chapter 4 new requirements for manufacturers' quality assurance programs and for situations where hazards involving compliant products are believed to exist, including the appropriate actions in addressing these 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. All design, performance, and testing requirements have been reviewed and refined as necessary.

This fourth edition was presented to the Association membership at the 2004 November meeting in Miami Beach, FLA on 17 November 2004, and issued by the Standards Council with an effective date of 7 February 2005.

In Memoriam, 11 September 2001

We pay tribute to the 343 members of FDNY who gave their lives to save civilian victims on 11 September 2001, at the World Trade Center. They are true American heroes in death, but they were also American heroes in life. We will keep them in our memory and in our hearts. They are the embodiment of courage, bravery, and dedication. May they rest in peace.

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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 the design, performance, testing, and certification of protective clothing and protective equipment manufactured for fire and emergency services organizations and personnel, to protect against exposures encountered during emergency incident operations. This Committee shall also have the primary responsibility for documents on the selection, care, and maintenance of such protective clothing and protective equipment by fire and emergency services organizations and personnel.

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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.

Contents

Chapter 1 Administration	1992- 6	6.6 Optional Chemical Flash Fire Protection Design Requirements	1992-19
1.1 Scope	1992- 6	Chapter 7 Performance Requirements	1992-19
1.2 Purpose	1992- 6	7.1 Protective Garment Elements and Items Performance Requirements	1992-19
1.3 Application	1992- 6	7.2 Protective Glove Elements and Items Performance Requirements	1992-20
1.4 Units	1992- 7	7.3 Protective Footwear Elements and Items Performance Requirements	1992-20
Chapter 2 Referenced Publications	1992- 7	7.4 Nonencapsulating Protective Ensemble Performance Requirements	1992-20
2.1 General	1992- 7	7.5 Encapsulating Protective Ensemble Performance Requirements	1992-20
2.2 NFPA Publications	1992- 7	7.6 Optional Chemical Flash Fire Escape Protection Performance Requirements	1992-21
2.3 Other Publications	1992- 7	Chapter 8 Test Methods	1992-21
Chapter 3 Definitions	1992- 8	8.1 Sample Preparation Procedures	1992-21
3.1 General	1992- 8	8.2 Liquidtight Integrity Test 1	1992-21
3.2 NFPA Official Definitions	1992- 8	8.3 Overall Garment Function and Integrity Test	1992-22
3.3 General Definitions	1992- 8	8.4 Chemical Penetration Resistance Test	1992-23
Chapter 4 Certification	1992-10	8.5 Burst Strength Test	1992-24
4.1 General	1992-10	8.6 Puncture Propagation Tear Resistance Test	1992-24
4.2 Certification Program	1992-10	8.7 Cold Temperature Performance Test 1 ...	1992-25
4.3 Inspection and Testing	1992-11	8.8 Seam/Closure Breaking Strength Test ...	1992-25
4.4 Annual Verification of Product Compliance	1992-12	8.9 Cold Temperature Performance Test 2 ...	1992-26
4.5 Manufacturers' Quality Assurance Program	1992-13	8.10 Liquidtight Integrity Test 2	1992-26
4.6 Hazards Involving Compliant Product ...	1992-13	8.11 Cut Resistance Test	1992-26
4.7 Manufacturers' Investigation of Complaints and Returns	1992-14	8.12 Puncture Resistance Test 1	1992-27
4.8 Manufacturers' Safety Alert and Product Recall Systems	1992-14	8.13 Gloved Hand Dexterity Test	1992-27
Chapter 5 Labeling and Information	1992-14	8.14 Puncture Resistance Test 2	1992-27
5.1 Product Label Requirements	1992-14	8.15 Abrasion Resistance Test	1992-28
5.2 User Information	1992-16	8.16 Impact and Compression Test	1992-28
5.3 Technical Data Package	1992-17	8.17 Ladder Shank Bend Resistance Test	1992-28
Chapter 6 Design Requirements	1992-17	8.18 Slip Resistance Test	1992-28
6.1 Protective Garment Elements and Items Design Requirements	1992-17	8.19 Overall Ensemble Flash Test	1992-29
6.2 Protective Glove Elements and Items Design Requirements	1992-17	8.20 Thermal Protective Performance Test	1992-30
6.3 Protective Footwear Elements and Items Design Requirements	1992-18	8.21 Flammability Resistance Test	1992-31
6.4 Nonencapsulating Ensemble Design Requirements	1992-18	Annex A Explanatory Material	1992-31
6.5 Encapsulating Ensemble Design Requirements	1992-18	Annex B Informational References	1992-34
		Index	1992-36

NFPA 1992**Standard on****Liquid Splash-Protective Ensembles and
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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.

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 for liquid splash-protective ensembles, ensemble elements, and protective clothing used by emergency response personnel during hazardous materials incidents.

1.1.2 This standard shall also specify additional *optional* criteria for liquid splash-protective ensembles for *escape protection only* from chemical flash fires encountered during hazardous materials incidents.

1.1.3 This standard shall specify requirements for new liquid splash-protective ensembles, new ensemble elements, and new protective clothing.

1.1.4* This standard alone shall not specify requirements for protective ensembles or clothing for hazardous materials emergencies involving known or suspected human carcinogen, or hazardous materials with known skin toxicity that are present as vapors, or hazardous material vapor atmospheres.

1.1.5* This standard alone shall not specify requirements for protection from chemical or biological terrorism agents or from chemical or biological terrorism incidents. Requirements for such protection shall be provided by protective ensembles that are certified as compliant with NFPA 1994, *Standard on Protective Ensembles for Chemical/Biological Terrorism Incidents*, or ensembles that are certified as compliant with NFPA 1991, *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies*.

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

1.1.7* This standard alone shall not specify requirements for protection from ionizing radiation, biological, liquefied gas, or cryogenic liquid hazards, or from explosive atmospheres.

1.1.8 This standard shall not specify requirements for the respiratory protection that is necessary for proper protection with the protective ensemble.

1.1.9 This standard shall not specify requirements for any accessories that could be attached to the product but are not necessary for the product to meet the requirements of this standard.

1.1.10 Certification of compliant liquid splash-protective ensembles, ensemble elements, and protective clothing to the requirements of this standard shall not preclude certification to additional appropriate standards where the ensemble, ensemble elements, or protective clothing meet all the applicable requirements of each standard.

1.1.11 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.

1.1.12 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 liquid-splash environments during hazardous materials emergency incidents.

1.2.1.1 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 liquid splash-protective ensembles, ensemble elements, and protective clothing.

1.2.1.2 The purpose of this option shall be to provide emergency response organizations the flexibility to specify this option 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, and certification of new liquid splash-protective ensembles, new ensemble elements, and new protective clothing.

1.3.2 This standard alone shall not apply to protective ensembles or clothing for hazardous materials emergencies involving known or suspected human carcinogen, or hazardous materials with known skin toxicity that are present as vapors, or hazardous material vapor atmospheres.

1.3.3 This edition of NFPA 1992 shall not apply to liquid splash-protective ensembles, ensemble elements, and protective clothing manufactured to previous editions of this standard.

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

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

1.3.6 This standard shall not apply to the respiratory protection that is necessary for proper protection with the liquid splash-protective ensemble or protective clothing.

1.3.7 This standard shall not apply to use requirements for liquid splash-protective ensembles or protective clothing as these requirements are specified in NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*.

1.3.8* 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, 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 1500, *Standard on Fire Department Occupational Safety and Health Program*, 2002 edition.

NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services*, 2002 edition.

NFPA 1991, *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies*, 2005 edition.

NFPA 1994, *Standard on Protective Ensembles for Chemical/Biological Terrorism Incidents*, 2001 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 Z41, *Standard for Personal Protection — Protective Footwear*, 1999.

ANSI Z89.1, *Standard for Industrial Head Protection*, 2003.

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

ASTM D 747, *Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam*, 1993.

ASTM D 751, *Standard Test Methods for Coated Fabrics*, 1998.

ASTM D 1630, *Standard Test Method for Rubber Property — Abrasion Resistance (NBS Abrader)*, 1994.

ASTM D 2136, *Standard Test Method for Coated Fabrics — Low-Temperature Bend Test*, 1998.

ASTM D 2582, *Standard Test Method for Puncture Propagation Tear Resistance of Plastic Film and Thin Sheeting*, 1993.

ASTM D 4157, *Standard Test Method for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder Method)*, 1992.

ASTM D 5151, *Standard Test Method for Detection of Holes in Medical Gloves*, 1992.

ASTM F 392, *Standard Test Method for Flex Durability of Flexible Barrier Materials*, 1993.

ASTM F 489, *Standard Test Method for Static Coefficient of Friction of Shoe Sole and Heel Materials as Measured by the James Machine*, 1996.

ASTM F 903, *Standard Test Method for Resistance of Protective Clothing Materials to Penetration by Liquids*, 1996.

ASTM F 1154, *Standard Practices for Qualitatively Evaluating the Comfort, Fit, Function, and Integrity of Chemical Protective Suit Ensembles*, 1996.

ASTM F 1301, *Standard Practice for Labeling Chemical Protective Clothing*, 1996.

ASTM F 1342, *Standard Test Method for Resistance of Protective Clothing Materials to Puncture*, 1996.

ASTM F 1358, *Standard Test Method for Resistance of Protective Clothing Materials to Flame Impingement*, 1995.

ASTM F 1359, *Standard Test Method for Measuring Liquid Penetration Resistance of Protective Clothing or Protective Ensembles Under a Shower Spray While on a Mannequin*, 1997.

ASTM F 1790, *Standard Test Methods for Measuring Cut Resistance of Materials Used in Protective Clothing*, 2004.

ASTM F 2010, *Standard Test Method for Evaluation of Glove Effects on Wearer Hand Dexterity Using a Modified Pegboard Test*, 2000.

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

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

2.3.4 ISO Publications. International Organization for Standardization, 1 rue de Varembé, Case postale 56, CH-1211 Genève 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 65, *General requirements for bodies operating product certification systems*, 1996.

ISO 9001, *Quality management systems — requirements*, 2000.

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

ISO 17025, *General requirements for the competence of testing and calibration laboratories*, 1999.

ISO 17492, *Clothing for protection against heat and flame — determination of heat transmission on exposure to both flame and radiant heat*, 2003.

2.3.5 U.S. Government Publication. U.S. Government Printing Office, Washington, DC 20402.

Title 29, Code of Federal Regulations, Part 1910.132.

2.3.6 Additional Publications. *Dangerous Properties of Industrial Chemicals*, 6th Edition, Sax, N. Irving, 1996.

NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, Public Health Services, Publication DHHS No. 85-114, September 1996.

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, 1996.

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. A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

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 Biological Agents. Biological materials that are capable of causing disease or long-term damage to the human body.

3.3.3 Boot. See 3.3.40, Liquid Splash-Protective Footwear.

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 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.

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

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

3.3.9* 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.

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

3.3.11 Chemical-Protective Material. Any material or composite used in liquid splash-protective ensemble or clothing for the purpose of providing protection from chemical hazards; can be a part of the "primary suit material."

3.3.12 Clothing Items. See 3.3.38, Liquid Splash-Protective Clothing.

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

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

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

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

3.3.17 Element(s). See 3.3.21, Ensemble Elements.

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

3.3.19 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 respirator.

3.3.20 Ensemble. See 3.3.39, Liquid Splash-Protective Ensemble.

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

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

3.3.23* 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. Any fitting externally located on, and part of, the ensemble which is not part of the garment material, visor material, gloves, footwear, seams, or closure assembly.

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

3.3.25 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 or listed products that are being produced by the manufacturer to the requirements of this standard.

3.3.26 Footwear. See 3.3.40, Liquid Splash-Protective Footwear.

3.3.27 Footwear Upper. That portion of the footwear above the sole, heel, or insole.

3.3.28 Garment. See 3.3.41, Liquid Splash-Protective Garment.

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

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

3.3.31 Garment Material. The principal chemical-protective material used in the construction of the liquid splash-protective suit.

3.3.32 Glove. See 3.3.42, Liquid Splash-Protective Glove.

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. Extremely short-wavelength, high energy penetrating rays of alpha, beta, gamma and x-rays emitted from radioactive elements and isotopes (radionuclides).

3.3.36 Ladder Shank. Reinforcement to the shank 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 Clothing. Multiple items of compliant protective clothing and equipment products that provide protection from some risks, but not all risks, of hazardous materials emergency incident operations involving liquids.

3.3.39* 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.

3.3.40* 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.

3.3.41* 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, excluding the head, hands, and feet.

3.3.42 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.

3.3.43 Maintenance. Procedures for inspection, repair, and removal from service of liquid splash-protective ensembles or clothing.

3.3.44 Manufacturer. The entity that assumes the liability, provides the warranty for the compliant product, or obtains the product certification.

3.3.45 Model. The collective term used to identify a group of individual liquid splash-protective ensembles or protective clothing 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.

3.3.46 Nonencapsulating. A type of ensemble that provides liquid splash protection, but does not provide vapor- or gas-tight protection, or liquid-tight protection, and does not cover the wearer's respirator.

3.3.47 Outer Boot. A secondary boot worn over footwear item or a bootie that provides physical protection for the chemical-protective material in order for liquid splash-protective footwear to meet certain requirements of this standard.

3.3.48 Outer Garment. A secondary garment worn over another garment that provides physical protection for the chemical-protective material in order for liquid splash-protective garment to meet certain requirements of this standard.

3.3.49 Outer Glove. A secondary glove worn over another glove that provides physical protection for the chemical-protective material in order for the liquid splash-protective glove to meet certain requirements of this standard.

3.3.50* Particulates. Finely divided solid matter that is dispersed in air.

3.3.51 Primary Suit Materials. Liquid splash-protective ensemble and clothing materials limited to the garment material, hood material, visor material, glove material, and footwear material that provide protection from chemical and physical hazards. This includes, in addition to the above materials, the wearer's respiratory protective equipment when designed to be worn outside the liquid splash-protective ensemble, the umbilical air hose, and all other exposed respiratory equipment materials designed to protect the wearer's breathing air and air path. Primary materials can be either single layers or composites.

3.3.52* Product Label. A label or marking affixed by the manufacturer to each compliant product, or product package. Such labels contain compliance statements, certification statements, general information, care, maintenance, or similar data.

3.3.53 Protective Clothing. See definition 3.3.38, Liquid Splash-Protective Clothing.

3.3.54 Protective Ensemble. See 3.3.39, Liquid Splash-Protective Ensemble.

3.3.55 Protective Footwear. See 3.3.40, Liquid Splash-Protective Footwear.

3.3.56 Protective Garment. See 3.3.41, Liquid Splash-Protective Garment.

3.3.57 Protective Gloves. See 3.3.42, Liquid Splash-Protective Glove.

3.3.58 Radionuclide. An isotope form of an element or radioactive element that emits radiation in excess of normal background radiation levels.

3.3.59 Recall System. The action 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.

3.3.60 Respiratory Equipment. A positive pressure, self-contained breathing apparatus (SCBA) or combination SCBA/supplied-air breathing apparatus certified by the National Institute for Occupational Safety and Health (NIOSH) and certified as compliant with NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services*.

3.3.61 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.

3.3.62 Storage Life. The date to remove from service a liquid splash-protective ensemble, element, or clothing item that has undergone proper care and maintenance in accordance with the manufacturer's instructions but has not been used either in training or at actual incidents.

3.3.63 Suit Closure. The component that allows the wearer to enter (don) and exit (doff) the liquid splash-protective ensemble.

3.3.64* Vapor-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 vapors.

3.3.65 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 1992 shall meet the requirements of Section 4.1, General; Section 4.2, Certification Program; Section 4.3, Inspection and Testing; Section 4.4, Annual Verification of Product Compliance; Section 4.5, Manufacturers' Quality Assurance Program; Section 4.6, Hazards Involving Compliant Product; Section 4.7, Manufacturers' Investigation of Complaints and Returns; and Section 4.8, Manufacturers' Safety Alert and Product Recall Systems.

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, Certification Program, and that is accredited for personal protective equipment in accordance with ISO 65, *General requirements for bodies operating product certification systems*. The accreditation shall be issued by an accreditation body op-

erating in accordance with ISO 17011, *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 1992, 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, Product Label Requirements.

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 2000 edition of this standard on or after the NFPA effective date for the 2005 edition, which is 7 February 2005.

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 2000 edition of this standard on or after 1 September 2005.

4.1.10 The certification organization shall require manufacturers to remove all certification labels and product labels indicating compliance with the 2000 edition of this standard from all ensembles and ensemble elements that are under the control of the manufacturer on 1 September 2005, and the certification organization shall verify this action is taken.

4.1.11 Liquid splash-protective ensembles, elements, or liquid splash-protective clothing items shall not be certified for chemical or specific chemical mixtures that have a vapor pressure greater than 5 mm Hg at 25°C (77°F) and have known or suspected human carcinogenicity as indicated by either the *Dangerous Properties of Industrial Chemicals* document or the *NIOSH Pocket Guide to Chemical Hazards* document.

4.1.12 Liquid splash-protective ensembles, or liquid splash-protective clothing items, shall not be certified for chemical or specific chemical mixtures with skin notations as indicated by the American Conference of Governmental Industrial Hygienists, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, and that have a vapor pressure greater than 5 mm Hg at 25°C (77°F).

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 65, *General requirements for bodies operating product certification systems*. The accreditation shall be issued by an accreditation body operating in accordance with ISO 17011, *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 laboratory facilities and equipment available for conducting proper tests to determine product compliance.

4.2.6.1 The certification organization laboratory facilities shall have in place 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, Manufacturers' Safety Alert and Product Recall Systems.

4.2.7.1* The certification organization shall require the manufacturer to have a product recall system specified in Section 4.8, Manufacturers' Safety Alert and Product Recall Systems, 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, Hazards Involving Compliant Product, 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, *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, *General requirements for accreditation bodies accrediting conformity assessment bodies*.