NFPA®

1975

Standard on Emergency Services Work Apparel

2019

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NFPA® 1975

Standard on

Emergency Services Work Apparel

2019 Edition

This edition of NFPA 1975, *Standard on Emergency Services Work Apparel*, was prepared by the Technical Committee on Special Operations 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 5, 2018, with an effective date of November 25, 2018, and supersedes all previous editions.

This edition of NFPA 1975 was approved as an American National Standard on November 25, 2018.

Origin and Development of NFPA 1975

The Technical Committee on Protective Equipment for Fire Fighters began work on NFPA 1975 in 1982 in response to requests from the fire service to establish requirements for flame-resistant station uniform clothing. The first edition was acted on by the membership of the Association at the 1985 Annual Meeting in Chicago, Illinois, and was issued with an effective date of June 26, 1985.

Following the 1985 edition, the name of the technical committee was changed to the Technical Committee on Fire Service Protective Clothing and Equipment. Under the direction of that technical committee, a subcommittee was formed to address station/work uniform concerns. The Subcommittee on Station/Work Uniforms began revision of the 1985 edition of NFPA 1975 in 1988, and the second edition was acted on by the membership of the Association at the 1990 Annual Meeting in San Antonio, Texas, and was issued with an effective date of August 17, 1990.

The Subcommittee on Station/Work Uniforms began an early revision (4-year cycle) of the 1990 edition of NFPA 1975 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 1975.

The third edition of NFPA 1975 encompassed revised scope and purpose sections to more clearly identify what a station/work uniform is intended to be and that, because of the limited degree of protection it affords, it is not, of itself, a primary protective garment. However, a station/work uniform garment should not cause or contribute to injury from an unexpected thermal exposure. The concept of "dual-purpose" station/work uniform garments that also are designed and certified as primary protective garments was introduced for situations including, but not limited to, wildland fire fighting or emergency medical services. Revisions to certain definitions also strengthened these areas. A new thermal shrinkage test for fabrics was added to the requirements. An increase of the pre-test conditioning by either washing or dry-cleaning was added to assure that treated flame-resistant fabrics will retain their flame-resistant characteristics over the expected life of the garment. The third edition was acted on by the membership of the Association at the Annual Meeting in San Francisco, California, on May 18, 1994, and was issued with an effective date of August 5, 1994.

In 1995, the NFPA Standards Council reorganized the entire project for fire service protective clothing and equipment. The former single Technical Committee on Fire Service Protective Clothing and Equipment was disbanded and a new Project on Fire and Emergency Services Protective Clothing and Equipment with a technical correlating committee and eight technical committees operating within it was established. The responsibility for NFPA 1975 was assigned to the new Technical Committee on Special Operations Protective Clothing and Equipment.

The fourth edition included a major change whereby flame-resistant garments were no longer required exclusively; garments were allowed to be made either from flame-resistant fabrics or from

cotton or wool fabrics. Flame resistance performance and testing was permitted to be specified by the purchaser where desired and would be above the minimum requirements. The heat resistance and thermal shrinkage resistance requirements were retained. The heat resistance and thermal shrinkage resistance performance requirements were combined into a single requirement. The chapter on certification was reformatted by moving product labels and user information into a new Chapter 3. A new Chapter 4 on design requirements was also added.

The 2004 edition of NFPA 1975 once again addressed the basic protection offered by these garments in nonemergency situations and the "user friendliness" of station/work uniform fabrics. The fifth edition included changes that distinguished between thermally stable materials and materials that could potentially melt onto skin under conditions of accidental flame or high heat exposure, and provided for verification and certification of station/work uniforms constructed from flame-resistant fabrics.

During the adoption process of the 1999 edition of NFPA 1975, a floor amendment at the 1998 NFPA Fall Meeting removed the requirements for flame-resistant fabrics and the specified flame resistance test, and instead permitted nominally 100 percent cotton or nominally 100 percent wool fabrics to be used. This led to fabric thermal stability problems, especially with wool fabrics but also with cotton fabrics that could cause or contribute to injury of the wearer. Because of the very nature of emergency services, emergency services personnel can be exposed to unknown and unexpected ignition sources during non-emergency situations when primary protective clothing is not being worn. Also, when emergency services personnel are wearing station/work uniforms constructed from these fabrics under primary protective clothing, the possibility of degradation of these fabrics exists and can lead to more severe injury for the wearer.

In response to these problems, the Technical Committee on Special Operations Protective Clothing and Equipment incorporated new thermal stability performance requirements and a new thermal stability test in the fifth edition of NFPA 1975. In addition, the heat and thermal shrinkage resistance performance requirements and test method in the 1999 edition were retained. The committee also included optional criteria so that organizations that specify flame-resistant fabrics for station/work uniforms could include reference to this optional requirement and test in purchase specifications so that the actual flame resistance could be verified and certified as compliant. This option also applied to manufacturers who claim that flame-resistant textiles are used in the construction of the station/work uniform. Additional product labeling provided confirmation of compliance with the standard. These changes defined acceptable fabrics for station/work uniforms and distinguished between materials that could potentially melt onto skin under conditions of accidental flame or high heat exposure and those that provide thermal stability.

The 2004 edition was also reformatted into the new style for all NFPA codes and standards and, therefore, the chapter titles and numbering, as well as paragraph numbering, were changed.

For the 2009 edition, the standard's title was changed to *Standard on Station/Work Uniforms for Emergency Services*. The change accommodated other emergency services who wished to have thermally stable or flame-resistant work uniforms. Also, definitions in Section 3.3 were revised for correctness and unnecessary definitions were deleted; a new requirement was added in Section 4.5 for the manufacturers' quality assurance program to add accreditation of the entity that audits the quality assurance program; the thermal stability requirements in Chapter 7 and the recording and reporting sections in Chapter 8 were revised to clarify the determination of the pass or fail requirements; and the number of cycles of dry cleaning conditioning in Section 8.1 was revised for consistency with the washing cycles.

For the 2014 edition of NFPA 1975, the terms *station/work uniform* and *station/work uniforms* were replaced with *work apparel* to increase readability and usability of the document. New definitions for *work apparel* and *work apparel garment* were added in Chapter 3. In addition, the performance requirements in Chapter 7 were reorganized. The base requirements for all work apparel were incorporated into one section (new Section 7.1) and the optional requirements were categorized into new sections (Sections 7.2, 7.3, and so forth). The committee felt this would help clarify that all the provisions in Section 7.1 are required to label work apparel as compliant with NFPA 1975.

For the 2019 edition of NFPA 1975, the title has been changed to *Standard on Emergency Services Work Apparel*. Odor resistance has been removed as an optional requirement and taken out of the standard, including the odor resistance test. Letter heights have been adjusted to bring them into line with the rest of the personal protective equipment (PPE) project. The thread heat resistance test has been revised to refer to ASTM D7138, *Standard Test Method to Determine Melting Temperature of Synthetic Fibers*, using either method 1 or method 2.

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Committee Scope: This Committee shall have primary responsibility for documents on special operations protective clothing and protective equipment, except respiratory equipment, that provides hand, foot, torso, limb, head, and interface protection for fire fighters and other emergency services responders during incidents involving special operations functions including, but not limited to, structural collapse, trench rescue,

confined space entry, urban search and rescue, high angle/mountain rescue, vehicular extraction, swift water or flooding rescue, contaminated water diving, and air operations.

This Committee shall also have primary responsibility for documents on station/work uniform garments that are not of themselves primary protective garments but can be combined with a primary protective garment to serve dual or multiple functions.

Additionally, this Committee shall have primary responsibility for documents on the selection, care, and maintenance of special operations protective clothing and equipment by fire and emergency services organizations and personnel.

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Standard on

Emergency Services Work Apparel

2019 Edition

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

Chapter 1 Administration

1.1 Scope.

1.1.1 This standard shall specify requirements for the design, performance, testing, and certification of nonprimary protective work apparel and the individual garments comprising work apparel.

1.1.2* Work apparel garments shall not include socks, dress uniforms, and specific types of undergarments including briefs, boxer shorts, boxer briefs, and bras.

1.1.3 This standard shall also specify requirements for the thermal stability of textiles used in the construction of work apparel.

Δ **1.1.4** This standard shall also specify optional requirements for flame resistance, water resistance, and insect repellency where such options are specified or claimed to be used in construction of work apparel.

1.1.5* This standard shall not specify requirements for clothing that is intended to provide primary protection from given hazard exposures.

1.1.6* Certification of work apparel to the requirements of this standard shall not preclude certification to additional applicable standards for primary protective clothing where the clothing meets all requirements of each standard.

1.1.7 This standard shall not be construed as addressing all of the safety concerns associated with the use of compliant work apparel garments for their personnel. It shall be the responsibility of the persons and organizations that use compliant work apparel garments to establish safety and health practices and determine the applicability of regulatory limitations prior to use.

1.1.8 This standard shall not be construed as addressing all of the safety concerns, if any, associated with the use of this standard by testing facilities. It shall be the responsibility of the persons and organizations that use this standard to conduct testing of work apparel garments to establish safety and health practices and determine the applicability of regulatory limitations prior to using this standard for any designing, manufacturing, and testing.

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

1.1.10 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 provide emergency services personnel with work apparel that will not contribute to burn injury severity.

1.2.1.1 To achieve this purpose, this standard shall establish minimum requirements for thermally stable textiles that will not rapidly deteriorate, melt, shrink, or adhere to the wearer's skin, causing greater, more severe burn injuries.

1.2.1.2 This standard shall also provide optional flame resistance requirements and tests to verify the flame resistance of textiles where the authority having jurisdiction specifies the use of flame resistance textiles for the construction of work apparel, or where the manufacturer represents work apparel textiles as flame resistant.

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1.2.1.3 This standard shall also provide optional liquid resistance requirements and tests to verify the liquid resistance of textiles where the authority having jurisdiction specifies the use of liquid resistant textiles for the construction of work apparel, or where the manufacturer represents work apparel textiles as having liquid resistant properties.

1.2.1.4 This standard shall also provide optional insect repellency requirements and tests to verify the insect repellency of textiles where the authority having jurisdiction specifies the use of insect repellent textiles for the construction of work apparel, or where the manufacturer represents work apparel textiles as having insect repellent properties.

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 emergency services personnel might be exposed.

1.2.3* This standard shall not be intended to serve as a detailed manufacturing or purchasing 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 designing, manufacturing, testing, and certification of new work apparel and the individual garments comprising work apparel.

1.3.2 This standard shall apply to nonprimary protective garments that comprise work apparel.

1.3.3 This standard alone shall not apply to clothing that is intended to provide primary protection from given hazard exposures. *(See A.1.1.5.)*

1.3.4 This edition of NFPA 1975 shall not apply to any work apparel manufactured to previous editions of this standard.

1.3.5 This standard shall not apply to any work apparel manufactured to the requirements of any other organization's standards.

1.3.6* This standard shall not apply to the use of work apparel.

1.3.7 This standard shall not apply to any accessories that could be attached to the certified product, before or after purchase, but are not necessary for the certified product to meet the requirements of this standard. *(See A.1.1.9.)*

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 might be 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. (Reserved)

2.3 Other Publications.

2.3.1 AATCC Publications. American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

AATCC 42, *Water Resistance: Impact Penetration Test*, 2017.

AATCC 135, *Dimensional Changes of Fabrics After Automatic Home Laundering*, 2004.

AATCC 158, *Dimensional Changes on Dry-Cleaning in Perchloroethylene: Machine Method*, 2016.

Δ **2.3.2 ASTM Publications.** ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

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

ASTM D1683/D1683M, *Standard Test Method for Failure in Sewn Seams of Woven Fabrics*, 2017e1.

ASTM D1776/D1776M, *Standard Practice for Conditioning and Testing Textiles*, 2016.

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

ASTM D6797, *Standard Test Method for Bursting Strength of Fabrics Constant Rate of Extension (CRE) Ball Burst Test*, 2015.

ASTM D7138, *Standard Test Method to Determine Melting Temperature of Synthetic Fibers*, 2016.

ASTM F2894, *Standard Test Method for Evaluation of Materials, Protective Clothing and Equipment for Heat Resistance Using a Hot Air Circulating Oven*, 2014.

• **2.3.3 ISO Publications.** International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

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

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

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

ISO/IEC 17021, *Conformity assessment — Requirements for bodies providing audit and certification of management systems — Part 1: Requirements,* 2015.

ISO/IEC 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.

2.3.4 Other Publications.

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

U.S. Department of Defense GL/PD 07-13C, *Purchase Description Coat, Army Combat Uniform,* U.S. Army Natick Research, Development and Engineering Center, Attn: RDNS-WPW-C, Kansas Street, Natick, MA 01760-5019, 2011.

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. For the purposes of this standard, the terms defined in this section shall have the meanings stated unless modified by the mandatory requirements of this standard. Where terms are not defined herein, those terms shall have the ordinarily accepted meanings, or the meaning that the text implies. Terms used in the present tense shall include the past and future tense. Terms used in the masculine gender shall include female and neuter genders, terms used in the singular shall include the plural, and terms used in the plural shall include the singular.

3.3.1 Accessories. An item or items that could be attached to a certified product but are not necessary for the certified product to meet the requirements of the standard.

3.3.2 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 compliance with the requirements of this standard.

3.3.3 Certification Mark or Label. The authorized identification symbol or logo of the certification organization.

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

3.3.5 Compliant. Meeting or exceeding all applicable requirements of this standard.

3.3.6 Drip. To run or fall in drops or blobs.

3.3.7* Emblems. Shields, heraldry, lettering, or printing that designates a product, a governmental entity, or a specific organization, rank, title, position, or other professional status that is painted, screened, embroidered, sewn, glued, bonded, or otherwise attached to a product in a permanent manner.

3.3.8 Findings. All materials used in the construction of items, excluding textiles and interlinings.

3.3.9* Flame Resistance. The property of a material whereby combustion is prevented, terminated, or inhibited following application of a flaming or non-flaming source of ignition, with or without subsequent removal of the ignition source.

3.3.10 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.

3.3.11 Garment. See 3.3.27, Work Apparel Garment.

3.3.12 Inherent Flame Resistance. Flame resistance that is derived from the essential characteristics of the fiber or polymer.

3.3.13 Insect Repellency. A finish applied to textiles to provide a deterrent against bites from mosquitoes, midges, ants, ticks, and chiggers.

3.3.14 Interlining. Any textile that is incorporated into any garment as a layer between outer and inner layers.

3.3.15 Major Seams. Classes of seams that designate minimum sewn seam requirements.

3.3.16 Manufacturer. The entity that directs or controls any of the following: compliant product design, compliant product manufacturing, or compliant product quality assurance; or the entity that assumes the liability for the compliant product or provides the warranty for the compliant product.

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

3.3.18 Nonprimary Protective Garment. A garment or clothing that is not designed nor intended to be the barrier of protection from a specific hazard exposure.

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3.3.19 Patches. See 3.3.7, Emblems.

3.3.20 Primary Protective Garment. A garment that is designed, certified, and intended to be the barrier of protection from a specific hostile environment.

3.3.21* Product Label. A marking provided by the manufacturer for each compliant product containing compliant statements, certification statements, manufacturer and model information, or similar data.

3.3.22 Separate. A material response evidenced by splitting or delaminating.

3.3.23 Textile Fabric. A planar structure material consisting of yarns or fibers.

3.3.24* Visibility Markings. Retroreflective and fluorescent conspicuity enhancements.

3.3.25 Water Resistance. A finish or an inherent property that limits the absorption of water.

3.3.26 Work Apparel. Nonprimary protective garments certified as compliant with this standard that are intended to be worn by emergency services personnel while on duty.

3.3.27 Work Apparel Garment. Textile apparel that cover the torso and limbs or parts of limbs, excluding heads, hands, and feet.

Chapter 4 Certification

4.1 General.

4.1.1 The process of certification for work apparel as being compliant with NFPA 1975 shall meet the requirements of Section 4.1, General; Section 4.2, Certification Program; Section 4.3, Inspection and Testing; Section 4.4, Recertification; 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 work apparel garments 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 Where work apparel garments are manufactured with flame-resistant textiles, the entire garment shall be certified as compliant with the requirements of Section 7.2 in addition to all other requirements of this standard.

4.1.3.1 Where work apparel is manufactured with water-resistant textiles, the entire garment shall be certified as compliant with the requirements of Section 7.3, in addition to all other requirements of this standard.

4.1.3.2 Where work apparel is manufactured with insect repellent, the entire garment shall be certified as compliant with the requirements of Section 7.4, in addition to all other requirements of this standard.

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Δ **4.1.4** 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/IEC 17065, *Conformity assessment — Requirements for bodies certifying products, processes and services*. The accreditation shall be issued by an accreditation organization operating in accordance with ISO 17011, *General requirements for accreditation bodies accrediting conformity assessment bodies*.

4.1.5 Manufacturers shall not claim compliance with a portion(s) or segment(s) of the requirements of this standard and shall not use the NFPA or the name or identification of this standard, NFPA 1975, in any statements about their respective products unless the products are certified as compliant with this standard.

4.1.6 All compliant work apparel garments shall be labeled and listed.

4.1.7 All compliant work apparel garments shall have a product label that meets the requirements specified in Section 5.1, Product Labeling Requirements.

4.1.7.1 Where work apparel garments are certified as compliant with only the mandatory, nonoptional requirements of this standard, the product label shall bear the text specified in 5.1.5.

4.1.7.2 Where work apparel is certified as compliant with the optional requirements specified in Sections 7.2 through 7.4, in addition to all other requirements of this standard, the product label shall bear the text specified in 5.1.6.

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

Δ **4.1.9** The certification organization shall not issue any new certifications to the 2014 edition of NFPA 1975 on or after the NFPA effective date for the 2019 edition of NFPA 1975.

Δ **4.1.10** The certification organization shall not permit any manufacturer to continue to label any products that are certified as compliant with the 2014 edition of NFPA 1975 on or after the effective date, plus 12 months.

Δ **4.1.11** The certification organization shall require manufacturers to remove all certification labels and product labels indicating compliance with the 2014 edition of NFPA 1975 from all products that are under the control of the manufacturer on the effective date, plus 12 months, and the certification organization shall verify that 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.

Δ **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, *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 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' Quality Assurance Program.

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.

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 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 the result to be in jeopardy of not complying with this standard, the certification organization shall conduct more frequent testing of the 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 initial certification and recertification of work apparel, 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*.

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.

4.3.5 Inspection by the certification organization shall include a review of all product labels to ensure that all required label attachment, compliance statements, certification statements, and other product information are at least as specified for the respective work apparel garment in Section 5.1, Product Labeling Requirements.

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 permitted by 5.1.8 and 5.2.5, 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, User Information, to ensure that the information has been developed and is available.

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

4.3.9 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.

4.3.9.1 Testing shall be performed on specimens representative of materials and components used in the actual construction of the protective ensemble and ensemble element.

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

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

4.3.11 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.

4.3.12 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.

4.3.13 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.

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

4.3.15 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.

4.3.16 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.

4.4 Recertification.

4.4.1 All work apparel clothing item products that are labeled as being compliant with this standard shall undergo recertification on an annual basis. This recertification shall include the following:

(1) Inspection and evaluation to all design requirements as required by this standard on all manufacturer models and components
(2) Testing to all performance requirements as required by this standard on all manufacturer models and components with the following protocol:
    (a) Where a test method incorporates testing both before and after laundering preconditioning specified in 8.1.3 and 8.1.4 and the test generates quantitative results, recertification testing shall be limited to the conditioning that yielded the worst-case test result during the initial certification for the model or component.
    (b) Where a test method incorporates testing both before and after laundering preconditioning specified in 8.1.3 and 8.1.4 and the test generates nonquantitative results such as pass/fail for melt/drip, recertification shall be limited to a single conditioning procedure in any given year. Subsequent annual recertifications shall cycle through the remaining conditioning procedures to ensure that all required conditionings are included over time.
    (c) Where a test method requires the testing of three specimens, a minimum of one specimen shall be tested for annual recertification.
    (d) Where a test method requires the testing of five or more specimens, a minimum of two specimens shall be tested for annual recertification.

4.4.2 Any change that affects the work apparel clothing item's performance under the design or performance requirements of this standard shall constitute a different model.

4.4.3 For the purpose of this standard, models shall include each unique pattern, style, or design of the individual work apparel clothing item.

4.4.4 Samples of manufacturer models and components for recertification shall be acquired as part of the follow-up program in accordance with 4.2.9 and shall be permitted to be used toward annual recertification.

4.4.5 The manufacturer shall maintain all design and performance inspection and test data from the certification organization used in the recertification of manufacturer models and components.

4.4.5.1 The manufacturer shall provide such data, upon request, to the purchaser or 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, Manufacturers' Safety Alert and Product Recall Systems.

4.5.2 The operation of the quality assurance program shall evaluate and test compliant product production to the requirements of 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/IEC 17021, *Conformity assessment — Requirements for bodies providing audit and certification of management systems — Part 1: Requirements*. The registrar shall affix the accreditation mark on the ISO registration certificate.

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

4.5.4* Any entity that meets the definition of *manufacturer* specified in 3.3.16 and therefore is considered to be the "manufacturer" but does not manufacture or assemble the compliant product shall meet the requirements specified in this section.

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 documented, and the documentation shall be provided to the manufacturer's ISO registrar and the certification organization.

4.6 Hazards Involving Compliant Product.

4.6.1* The certification organization shall establish procedures to be followed where situation(s) are reported in which a compliant product is subsequently found to be hazardous. These procedures shall comply with the provisions of ISO Guide 27, *Guidelines for corrective action to be taken by a certification body in the event of misuse of its mark of conformity*, and as modified herein.

4.6.2* Where a report of a hazard 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 products or compliant product components manufactured by other manufacturers or certified by other certification organizations.

4.6.7 The certification organization shall also investigate reports of a hazard where a compliant product is gaining widespread use in applications not foreseen when the standard was written, such applications in turn 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, Manufacturers' Investigation of Complaints and Returns.

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.

Δ **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.

4.7 Manufacturers' Investigation of Complaints and Returns.

4.7.1 Manufacturers shall provide corrective action in accordance with ISO 9001, *Quality management systems — Requirements*, for investigating written complaints and returned products.

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

4.7.3 Where the manufacturer discovers, during the review of specific returns or complaints, that a compliant product or compliant product component 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 its review to assist the certification organization with its 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, either to issue a safety alert or to 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 one week period following the manufacturer's decision to issue a safety alert or to 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 a product that is recalled and for 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 Labeling Requirements.

5.1.1 Work apparel shall have a product label or labels permanently and conspicuously attached to it. *(See A.4.1.8.)*

5.1.1.1 The required label shall be permitted to be printed directly on the compliant product.

5.1.2 Multiple label pieces shall be permitted if necessary to carry all statements and information required to be on the product label.

5.1.3 The certification organization's label, symbol, or identifying mark shall be permanently attached to the product label or shall be part of the product label.

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

5.1.5 Where work apparel is certified as compliant with only the mandatory base requirements of this standard, the following statement shall be printed legibly on the product label. All letters shall be at least 2.5 mm ($\frac{3}{32}$ in.) high.

THIS GARMENT MEETS THE BASE REQUIREMENTS OF NFPA 1975-2019 EDITION.

DO NOT REMOVE THIS LABEL.

Δ **5.1.6** Where work apparel is certified as compliant with the mandatory base requirements of this standard, and also certified as compliant with one or more of the optional requirements of this standard, the statement in 5.1.5 shall be printed legibly on the product label. The label shall also indicate the applicable optional requirement(s) by either the symbol or statement as identified in Table 5.1.6. Where the symbol is used to identify compliance with the optional requirement(s), the statement shall be included in the user information to explain that symbol. All letters shall be at least 2.5 mm ($\frac{3}{32}$ in.) high.

5.1.7 The following information shall also be printed legibly on the product label. All letters shall be at least 1.6 mm ($\frac{1}{16}$ in.) high:

(1) Manufacturer's name
(2) Manufacturer's garment identification number, lot number, or serial number
(3) Country of manufacture

Δ **Table 5.1.6 Label Symbols for Work Apparel**

Optional Requirement	Compliance Statement	Symbol
7.2 Optional Requirements for Flame-Resistant Work Apparel	THIS GARMENT MEETS THE OPTIONAL FLAME RESISTANCE REQUIREMENTS OF NFPA 1975-2019.	FR
7.3 Optional Requirements for Water-Resistant Work Apparel	THIS GARMENT MEETS THE OPTIONAL WATER RESISTANCE REQUIREMENTS OF NFPA 1975-2019.	WR
7.4 Optional Requirements for Insect Repellent Work Apparel	THIS GARMENT MEETS THE OPTIONAL INSECT REPELLENT REQUIREMENTS OF NFPA 1975-2019.	IR

(4) Model name, number, or design
(5) Date of manufacture
(6) Size
(7) Cleaning and drying instructions, including applicable warnings regarding detergents, soaps, cleaning additives, and bleaches
(8) Fiber content and composition

5.1.8 Symbols and other pictorial graphic representations shall be permitted to be used in place of worded statements on the product labels where explanations for symbols and pictorial graphic representations are explained in the user information.

5.2 User Information.

5.2.1 The manufacturer shall provide user information including, but not limited to, warnings, information, and instructions with each work apparel garment.

5.2.2* The manufacturer shall attach the required user information, or packaging containing the user information, to the work apparel garment in such a manner that it is not possible to use the garment 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 work apparel garment so that a deliberate action is necessary to remove it.

5.2.4 The manufacturer shall provide notice that the user information is to be removed only by the end user.

5.2.5 Symbols and other pictorial graphic representations shall be permitted to be used to supplement worded statements or in place of worded statements in the user information where explanations for symbols and pictorial graphic representations are explained in the user information.

5.2.6 The manufacturer shall provide at least the following instructions and information with each work apparel garment:

(1) Pre-use information as follows:
  (a) Manufacturer's name and address
  (b) Safety considerations
  (c) Garment marking recommendations and restrictions
  (d) A statement that most performance properties of the garment cannot be tested by the user in the field
  (e) Warranty information
(2) Inspection frequency and details
(3)* Maintenance information as follows:
  (a) Cleaning instructions
  (b) Methods of repair where applicable
  (c) Decontamination procedures for both chemical and biological contamination
(4) Retirement and disposal criteria and consideration

Chapter 6 Design Requirements

6.1 General.

6.1.1 Work apparel shall have at least the applicable design requirements specified in this section when inspected by the certification organization as specified in Section 4.3, Inspection and Testing.

6.1.2 All work apparel hardware shall be examined and shall be free of rough spots, burrs, or sharp edges.

6.1.3 Any metal findings of work apparel shall not come into direct contact with the wearer's body.

6.1.4 Where work apparel garments are constructed from flame-resistant textiles, the garments shall be stitched with thread of an inherently flame-resistant fiber.

N **6.1.5*** Aftermarket products applied to apparel shall not be utilized to meet any performance requirements of this standard.

6.2 Configuration.

6.2.1 Work apparel designed for the upper torso shall be permitted to be configured as follows:

(1) Shirt, with collar, full-length front opening, either long sleeve or short sleeve
(2) Polo or golf-style shirt, with collar, pullover with partial front opening, either long sleeve or short sleeve
(3) Tee shirt, pullover without front opening, without collar, either long sleeve or short sleeve *(See A.1.1.2.)*
(4) Sweatshirt, pullover, with or without collar, either long sleeve or short sleeve
(5) Jacket, with or without collar, with full front opening and long sleeves

6.2.2 Work apparel garments designed for the lower torso shall be permitted to be configured as follows:

(1) Pants, extending from the waist to the ankles
(2) Shorts, extending from the waist to a point at or above the knee

Chapter 7 Performance Requirements

7.1 Base Requirements for Work Apparel.

7.1.1 Heat and Thermal Shrinkage Resistance.

7.1.1.1 Textile fabrics, excluding interlinings, shall be tested individually for heat resistance as specified in Section 8.2, and shall not melt, drip, separate, or ignite, and shall not shrink more than 10 percent in any direction. Where the optional stretching frame is specified to be used for testing knits, fabrics shall be able to be stretched to their original dimensions and remain intact.

Δ **7.1.1.2** Findings and visibility markings — excluding labels and excluding emblems, collar stays, elastic, and hook-and-pile fasteners placed where they will not come into direct contact with the body — shall be tested individually for heat resistance as specified in Section 8.2, and shall not melt, drip, separate, or ignite.

7.1.2 Thermal Stability.

7.1.2.1 Textile fabrics, excluding interlinings, shall be tested individually for thermal stability as specified in Section 8.3, and shall not melt, ignite, or stick to the glass plates and shall have a rating of resistance to blocking of 1 or 2.

7.1.2.2 All thread utilized in work apparel shall be tested for heat resistance as specified in Section 8.7, and shall not melt at or below 260°C (500°F).

7.1.3 Seam Strength.

7.1.3.1 Garment major seams shall be tested for seam strength as specified in Section 8.4, and shall have a minimum breaking strength of 133 N (30 lb) for either thread or fabric.

7.1.3.2 Seam strength shall be considered acceptable where the fabric strength is less than the required seam strength specified in 7.1.3.1, provided the fabric fails without seam failure below the applicable forces specified in 7.1.3.1.

7.1.4 Product Label Printing Durability. Product labels shall be tested for printing durability as specified in Section 8.5, and shall be legible.

7.2* Optional Requirements for Flame-Resistant Work Apparel.

7.2.1 Where work apparel is represented as being flame resistant, it shall also meet the requirements of Section 7.1.

7.2.2 Where work apparel is represented as being flame resistant, textile fabrics and visibility markings excluding interlinings, emblems, labels, elastic, hook and pile fasteners, and closure tape, shall be tested individually for flame resistance as specified in Section 8.6, and shall have an average char length of not more than 150 mm (6 in.), shall have an average afterflame of not more than 2 seconds, and shall not melt or drip. *(See Section B.5.)*

7.2.3 Where work apparel is represented as being flame resistant, visibility markings and small textile items, excluding interlinings, emblems, labels, elastic, hook and pile fasteners, and closure tape, that are not large enough to meet the specimen requirements specified in 8.6.3.1 shall be tested for flame resistance as specified in Section 8.6, and shall not be totally consumed, shall not have afterflame of more than 2 seconds, and shall not melt or drip.

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7.3* Optional Requirements for Water-Resistant Work Apparel.

7.3.1 Where work apparel is represented as being water resistant it shall also meet the requirements of Section 7.1.

7.3.2 Where work apparel is represented as being water resistant, textile fabrics, excluding visibility markings, emblems, labels, elastic, hook and pile fasteners, and closure tape, shall be tested as specified in Section 8.8, and shall have a water absorption of 15 percent or less.

7.4* Optional Requirements for Insect Repellent Work Apparel.

7.4.1 Where work apparel is represented as being insect repellent it shall also meet the requirements of Section 7.1.

7.4.2 Where work apparel is represented as having insect repellent properties, textile materials, excluding interlinings and reinforcements, shall be tested for insect repellency as specified in Section 8.9, and shall have a permethrin level of 0.025 – 0.135 mg/cm^2.

7.4.3 Where work apparel is represented as having insect repellent properties as specified in Section 7.4 and are also represented as having flame-resistant properties as specified in Section 7.2, textiles, excluding interlinings, emblems, labels, elastic, hook and pile fasteners, and closure tape, shall be individually retested after treatment for insect repellency for flame resistance as specified in Section 8.6, and shall have an average char length of not more than 150 mm (6 in.), shall have an average afterflame time of not more than 2 seconds, and shall not melt or drip.

Chapter 8 Test Methods

8.1 Sample Preparation Procedures.

8.1.1 Application.

8.1.1.1 The sample preparation procedures contained in Section 8.1 shall apply to each test method in this chapter, as specifically referenced in the sample preparation section of each test method.

8.1.1.2 Only the specific sample preparation procedure or procedures referenced in the sample preparation section of each test method shall be applied to that test method.

8.1.2 Room Temperature Conditioning Procedure.

Δ **8.1.2.1** Specimens shall be conditioned at a temperature of 21°C, ±3°C (70°F, ±5°F) and a relative humidity of 65 percent, ±5 percent, until equilibrium is reached, as determined in accordance with ASTM D1776/D1776M, *Standard Practice for Conditioning and Testing Textiles*, or for at least 24 hours, whichever is shortest.

8.1.2.2 Specimens shall be tested within 5 minutes after removal from conditioning.

8.1.3 Washing and Drying Procedure.

8.1.3.1 Specimens shall be subjected to 25 cycles of washing and drying in accordance with the procedure specified in AATCC 135, *Dimensional Changes of Fabrics in Automatic Home Laundering*, using Machine Cycle 1, Wash Temperature V, and Drying Procedure Ai.

8.1.3.2 Flame-resistant textiles being tested to the Flame Resistance Test as specified in Section 8.6 shall be subjected to 100 cycles of washing and drying in accordance with the procedure specified in AATCC 135, *Dimensional Changes of Fabrics in Automatic Home Laundering* using Machine Cycle 1, Wash Temperature V, and Drying Procedure Ai.

8.1.3.3 A 1.8 kg, ±0.1 kg (4 lb, ±0.2 lb) load shall be used.

8.1.3.4 A laundry bag shall not be used.

8.1.4 Commercial Dry-Cleaning Procedure.

8.1.4.1 Specimens shall be subjected to 25 cycles of dry cleaning as specified in the procedures of Sections 9.2 and 9.3 of AATCC 158, *Dimensional Changes in Dry-Cleaning in Perchloroethylene: Machine Method.*

8.1.4.2 Flame-resistant textiles being tested to the Flame Resistance Test as specified in Section 8.6 shall be subjected to 100 cycles of dry cleaning as specified in the procedures of Sections 9.2 and 9.3 of AATCC 158, *Dimensional Changes in Dry-Cleaning in Perchloroethylene: Machine Method.*

8.2 Heat and Thermal Shrinkage Resistance Test.

8.2.1 Application.

8.2.1.1 This test method shall apply to textiles, visibility markings, and findings.

8.2.1.2 Modifications to this test method for testing woven and nonwoven textiles shall be as specified in 8.2.8.

8.2.1.3 Modifications to this test method for visibility markings and findings shall be as specified in 8.2.9.

8.2.1.4 Modifications to this test method for testing knits shall be as specified in 8.2.10.

8.2.2 Samples.

8.2.2.1 Samples for preconditioning shall be a 1 m (1 yd) square of textile.

8.2.2.2 If the manufacturer designates that the garments are to be washed, separate samples shall be preconditioned according to 8.1.3.1.

8.2.2.3 If the manufacturer designates that the garments are to be dry cleaned, separate samples shall be preconditioned according to 8.1.4.1.

8.2.3 Specimens.

8.2.3.1 Heat resistance testing only shall be conducted on a minimum of three specimens for each finding not excluded in 7.1.1.2.

8.2.3.2 Both heat and thermal shrinkage resistance testing shall be conducted on a minimum of three specimens for each textile.

8.2.3.3 Specimens shall be tested both before and after the preconditioning specified in either 8.2.2.2 or 8.2.2.3.

8.2.3.4 All specimens shall be conditioned as specified in 8.1.2 prior to testing.

8.2.4 Apparatus. The test oven shall be as specified in ASTM F2894, *Standard Test Method for Evaluation of Materials, Protective Clothing and Equipment for Heat Resistance Using a Hot Air Circulating Oven.*

8.2.5 Procedure. Testing shall be performed in accordance with ASTM F2894, *Standard Test Method for Evaluation of Materials, Protective Clothing and Equipment for Heat Resistance Using a Hot Air Circulating Oven*, using the following parameters:

(1) The test temperature shall be 260°C, +6/–0°C (500°F, +10/–0°F).
(2) The optional stretching frame shall be used, as specified in 8.2.10.5 and 8.2.10.6, to evaluate knit materials, where specified by the fabric manufacturer.

8.2.6 Report.

8.2.6.1 Observations of ignition, melting, dripping, or separation for each specimen shall be recorded and reported.

8.2.6.2 The percent change in the width and length dimensions of each textile specimen shall be calculated and recorded.

8.2.6.3 Results shall be reported as the average of all three specimens in each direction.

8.2.7 Interpretation.

8.2.7.1 Any evidence of ignition, melting, dripping, or separation on any specimen shall constitute failing performance.

8.2.7.2 The average percent shrinkage change in each direction shall be used to determine pass/fail.

8.2.7.3 Failure in any one direction shall constitute failure for the entire sample.

8.2.8 Specific Requirements for Testing Woven and Nonwoven Textiles.

8.2.8.1 Each specimen shall be 380 mm × 380 mm, ±13 mm (15 in. × 15 in., ±½ in.).

8.2.8.2 Testing shall be performed as specified in 8.2.2 through 8.2.7.

8.2.8.3 Observations of ignition, melting, dripping, or separation shall be recorded and reported.

8.2.8.4 Five minutes after the specified exposure, and prior to measuring shrinkage, woven and nonwoven textile specimens shall be restored to their original state by manually flattening any curling or rippling that resulted from the specified exposure.

8.2.9 Specific Requirements for Testing Findings and Visibility Markings.

8.2.9.1 Specimens shall be in the center of 150 mm × 150 mm, ±13 mm (6 in. × 6 in., ±½ in.) pieces of the garment textile.

8.2.9.2 Hardware shall be affixed in a fashion representative of their use in the finished product.

8.2.9.3 Testing shall be performed as specified in 8.2.2 through 8.2.7.

8.2.9.4 Thermal shrinkage shall not be measured.

8.2.10 Specific Requirements for Testing Knits.

8.2.10.1 Each specimen shall be 380 mm × 380 mm ±13 mm (15 in. × 15 in. ±½ in).

8.2.10.2 Testing shall be performed as specified in 8.2.2 through 8.2.7.

8.2.10.3 Observations of ignition, melting, dripping, or separation for each specimen shall be recorded and reported.

8.2.10.4 Any evidence of ignition, melting, dripping, or separation for each specimen shall be recorded and reported.

8.2.10.5 Where the use of the optional stretching frame is specified by the fabric manufacturer, 5 minutes after the specified exposure, knit textiles shall be pulled in such a way as to return the benchmarks to their original dimensions and held for 10 minutes, followed by a 10-minute relaxation prior to measuring shrinkage.

N **8.2.10.5.1** The surface for specimen relaxation shall be a smooth, flat, horizontal surface that is free from imperfections that could snag the specimen or impede relaxation.

8.2.10.6 Where the optional stretching frame is specified to be used, and fabrics exhibit breaking or inability to be stretched to the original dimensions, this result shall constitute failure.

8.3 Thermal Stability Test.

8.3.1 Application. This test method shall apply to textiles.

8.3.2 Samples.

8.3.2.1 Samples for preconditioning shall be a 1 m (1 yd) square of textile.

8.3.2.1.1 Where a 1 m square of textile cannot be obtained, the samples for preconditioning shall be a minimum of the size to be tested.

8.3.2.2 If the manufacturer designates that the garments are to be washed, separate samples shall be preconditioned according to 8.1.3.1.

8.3.2.3 If the manufacturer designates that the garments are to be dry cleaned, separate samples shall be preconditioned according to 8.1.4.1.

8.3.3 Specimens.

8.3.3.1 Thermal stability testing shall be conducted on a minimum of three specimens for each textile.

8.3.3.2 Specimens shall be cut from the preconditioned sample.

8.3.3.3 Specimens shall be tested after the preconditioning specified in either 8.3.2.2 or 8.3.2.3.

8.3.3.4 All specimens shall be conditioned as specified in 8.1.2 prior to testing.

8.3.4 Apparatus.

8.3.4.1 The test oven shall be as specified in ASTM F2894, *Standard Test Method for Evaluation of Materials, Protective Clothing and Equipment for Heat Resistance Using a Hot Air Circulating Oven.*

8.3.4.2 Clean borosilicate or soda lime glass plates measuring 100 mm × 100 mm × 3 mm (4 in. × 4 in. × ⅛ in.) shall be used.

8.3.5 Procedure. Specimens shall be tested according to ASTM D751, *Standard Test Methods for Coated Fabrics*, using the Procedures for Blocking Resistance at Elevated Temperatures, specified in Sections 84 through 88, with the following modifications:

(1) The glass plates specified in 8.3.4.2 shall be used.
(2) A test temperature of 265°C, +3/–0°C (510°F, +5/–0°F) shall be used.
(3) The 1.8 kg (4 lb)mass shall be removed from the glass plates within 5 minutes after removal of the glass plates from the oven.
(4) The specimens shall remain between the glass plates and cool for 18 hours, +1/–0 hours after removal of the glass plates from the oven.
(5) In removing specimens from the glass plates, the rating of resistance to blocking shall be determined and observations shall be made whether each specimen sticks to the glass plates or shows evidence of melting or ignition. The determination of a specimen sticking to the glass plates shall be made by placing the glass plates and specimen on a flat level surface and raising the top glass plate in a smooth continuous motion with the plate parallel to the surface and observing if the material separates from either of the glass plates. If the tested fabric separates from the lower glass plate but clings to the upper glass plate, invert the upper glass, lay it on a flat surface, and raise the fabric with a smooth continuous motion. If the fabric does not separate cleanly from either of the glass plates, or if it lifts the glass plate completely off the surface, then it shall be judged as sticking.
(6) Where the specimen size is such that a 102 mm × 102 mm (4 in. × 4 in.) square cannot be achieved, three specimens shall be tested folded face to face, and three specimens shall be tested folded back to back.

8.3.6 Report.

8.3.6.1 The condition of each specimen shall be recorded and reported.

8.3.6.2 Where specimens show no damage, the condition shall be recorded and reported as "no damage."

8.3.6.3 Where specimens stick to the glass plates or show evidence of melting or ignition, the applicable condition shall be recorded and reported. The rating of resistance to blocking shall also be recorded and reported.

8.3.7 Interpretation.

8.3.7.1 Observations of any sticking to the glass plate, melting, or ignition for any specimen shall constitute failure for the textile being tested.

8.3.7.2 A rating of resistance to blocking other than 1 or 2 shall also constitute failing performance.

8.4 Seam Breaking Strength Test.

8.4.1 Application.

8.4.1.1 This test method shall apply to seam assemblies for garments.

8.4.1.2* This test method shall apply to major seams.

8.4.2 Samples.

8.4.2.1 Samples shall be a straight seam cut from a finished garment or shall be prepared by joining two pieces of the garment textile.

8.4.2.2 Where the sample is prepared by joining two pieces of woven textile, the textile shall be joined as specified in 8.2.1.2 of ASTM D1683/D1683M, *Standard Test Method for Failure in Sewn Seams of Woven Fabrics.*

8.4.2.3 Where the sample is prepared by joining two pieces of knit or woven stretch textiles, the textiles shall be joined as specified in ASTM D6797, *Standard Test Method for Bursting Strength of Fabrics Constant Rate of Extension (CRE) Ball Burst Test.*

8.4.3 Specimens.

8.4.3.1 A minimum of five seam specimens representative of the type of major seam in the garment shall be tested.

8.4.3.2 Specimens to be tested shall be the same thread, seam type, and stitch type used in the finished garment.

8.4.3.3 All specimens shall be conditioned as specified in 8.1.2 prior to testing.

8.4.4 Procedure.

8.4.4.1 All woven seam assemblies shall be tested in accordance with ASTM D1683/D1683M, *Standard Test Method for Failure in Sewn Seams of Woven Fabrics.* The test machine shall be operated at a rate of 305 mm/min (12 in./min).

8.4.4.2 All knit seam assemblies shall be tested in accordance with ASTM D6797, *Standard Test Method for Bursting Strength of Fabrics Constant Rate of Extension (CRE) Ball Burst Test.* Padding of the clamps shall be permitted to prevent fabric slippage due to the thickness of the seam. The seam allowance shall be placed facing away from the penetrating ball.

8.4.5 Report.

8.4.5.1 The seam breaking strength for each seam specimen shall be recorded and reported.

8.4.5.2 The average seam breaking strength for each seam type shall also be recorded and reported.

8.4.5.3 The type of seams tested shall be reported as to whether the specimens were cut from the finished garment or prepared from fabric samples.

8.4.6 Interpretation. The average seam breaking strength for each seam type shall be used to determine pass or fail performance.

8.5 Label Print Durability Test.

8.5.1 Application. This test method shall apply to garment labels.

8.5.2 Samples.

8.5.2.1 Samples for preconditioning shall be specimens of labels attached in the center of a 1 m (1 yd) square of garment textile.

8.5.2.2 Samples shall be preconditioned according to 8.1.3 where the manufacturer designates that the garments are to be washed.

8.5.2.3 Samples shall be preconditioned according to 8.1.4 where the manufacturer designates that the garments are to be dry cleaned.

8.5.3 Specimens.

8.5.3.1 A minimum of three different specimens shall be tested.

8.5.3.2 Specimens of product labels shall be attached to garment textile.

8.5.3.3 Specimens shall be tested after the preconditioning specified in either 8.5.2.2 or 8.5.2.3.

8.5.3.4 All specimens shall be conditioned as specified in 8.1.2 prior to testing.

8.5.4 Procedure. Specimens shall be examined at a distance of 305 mm (12 in.) by the unaided eye with 20/20 vision or vision corrected to 20/20.

8.5.5 Report. The legibility of each specimen shall be recorded and reported as pass or fail.

8.5.6 Interpretation. Any one specimen failing the test shall constitute failing performance for the test.

8.6 Flame Resistance Test.

8.6.1 Application.

8.6.1.1 This test method shall apply to flame-resistant textiles and visibility markings.

8.6.1.2 Modifications to this test method for testing woven textile materials shall be as specified in 8.6.8.

8.6.1.3 Modifications to this test method for testing knit textile materials shall be as specified in 8.6.9.

8.6.1.4 Modifications to this test method for testing nonwoven textile materials shall be as specified in 8.6.10.

8.6.1.5 Modifications to this test method for testing small textile items not meeting the specimen size requirements of 8.6.3.1 shall be as specified in 8.6.11.

8.6.1.5.1 Modifications to this test method for testing visibility markings shall be as specified in 8.6.12

8.6.1.6 Modifications to this test method for testing textile materials that are represented as being flame resistant and insect repellent shall be as specified in 8.6.13.

8.6.2 Samples.

8.6.2.1 Samples for preconditioning shall be 1 m (1 yd) square of each textile material.

8.6.2.2 If the manufacturer designates that the garments are to be washed, separate samples shall be preconditioned according to 8.1.3.2.

8.6.2.3 If the manufacturer designates that the garments are to be dry cleaned, separate samples shall be preconditioned according to 8.1.4.2.

8.6.3 Specimens.

8.6.3.1 Specimens shall consist of a 75 mm × 305 mm (3 in. × 12 in.) rectangle with the long dimension parallel to either the warp or filling, the wale or course, or machine or cross-machine direction of the material.

8.6.3.2 Each individual layer of multilayer material systems or composites shall be separately tested.

8.6.3.3 Specimens shall be tested after the preconditioning specified in either 8.6.2.2 or 8.6.2.3.

8.6.3.4 All specimens shall be conditioned as specified in 8.1.2 prior to testing.

8.6.4 Apparatus. The test apparatus specified in ASTM D6413/D6413M, *Standard Test Method for Flame Resistance of Textiles (Vertical Test)*, shall be used.

8.6.5 Procedure.

8.6.5.1 Flame resistance testing shall be performed in accordance with ASTM D6413/D6413M, *Standard Test Method for Flame Resistance of Textiles (Vertical Test)*.

8.6.5.2 Each specimen shall be examined for evidence of melting or dripping.

8.6.6 Report.

8.6.6.1 Afterflame time and char length shall be recorded and reported for each specimen.

8.6.6.2 The afterflame time shall be recorded and reported to the nearest 0.2 second.

8.6.6.3 The char length shall be recorded and reported to the nearest 3 mm (⅛ in.).

8.6.6.4 The average afterflame time and char length for each material shall be calculated, recorded, and reported.

8.6.6.5 Observations of melting or dripping for each specimen shall be recorded and reported.

8.6.7 Interpretation.

8.6.7.1 Pass or fail performance shall be based on any observed melting or dripping, the average afterflame time, and the average char length.

8.6.7.2 Failure in either direction shall constitute failure of the material.

8.6.8 Specific Requirements for Testing Woven Textile Materials.

8.6.8.1 Five specimens from each of the warp and filling directions shall be tested.

8.6.8.2 No two warp specimens shall contain the same warp yarns, and no two filling specimens shall contain the same filling yarns.

8.6.8.3 Samples for conditioning shall be at least a 1 m (1 yd) square of each material.

8.6.8.4 Testing shall be performed as specified in 8.6.2 through 8.6.7.

8.6.9 Specific Requirements for Testing Knit Textile Materials.

8.6.9.1 Five specimens from each of the two directions shall be tested.

8.6.9.2 Samples for conditioning shall include material that is a minimum of 75 mm × 305 mm (3 in. × 12 in.).

8.6.9.3 Testing shall be performed as specified in 8.6.2 through 8.6.7.

8.6.10 Specific Requirements for Testing Nonwoven Textile Materials.

8.6.10.1 Five specimens from each of the machine and cross machine directions shall be tested.

8.6.10.2 Samples for conditioning shall be at least a 1 m (1 yd) square of each material.

8.6.10.3 Testing shall be performed as specified in 8.6.2 through 8.6.7.

8.6.11 Specific Requirements for Testing Small Textile Materials.

8.6.11.1 Five specimens attached to the textile layer as used in the station/work garments shall be tested.

8.6.11.2 The specimens shall be attached to the textile layer such that the bottom exposure edge of the item coincides with the bottom exposure edge of the textile support layer.

8.6.11.3 Samples for conditioning shall be a 1 m (1 yd) square of the textile layer on which the small specimens are attached.

8.6.11.4 Testing shall be performed as specified in 8.6.2 through 8.6.7; however, char length shall not be measured.

8.6.12 Specific Requirements for Testing Visibility Markings.

8.6.12.1 Samples for preconditioning shall be attached to a textile layer measuring 1 m (1 yd) square.

8.6.12.2 Where the visibility markings do not meet the specimen size requirements, the markings shall be attached to a textile layer meeting the specimen size requirements so that the bottom exposure edge of the item coincides with the bottom exposure edge of the textile support layer.

8.6.12.3 Testing shall be performed as specified in 8.6.2 through 8.6.7 with the exception that testing shall be limited to only the length direction of the visibility marking material and the char length shall not be measured.

8.6.13 Specific Requirements for Testing Insect Repellent Materials.

8.6.13.1 Textile fabrics that are represented as being both insect repellent and flame resistant shall be tested in both the pre– and post–insect repellent treatment configurations.

8.6.13.2 Pre-Treated Textile Materials.

8.6.13.2.1 Woven pre–insect repellent treatment textile materials shall be tested in accordance with 8.6.8.

8.6.13.2.2 Knit pre–insect repellent treatment textile materials shall be tested in accordance with 8.6.9.

8.6.13.3 Woven Post-Treated Textile Materials.

8.6.13.3.1 Five specimens from each of the warp and filling directions shall be tested.

8.6.13.3.2 No two warp specimens shall contain the same warp yarns, and no two filling specimens shall contain the same filling yarns.

8.6.13.3.3 Samples shall be permitted to be obtained from yardage or finished garments.

8.6.13.3.4 Testing shall be performed as specified in 8.6.2 through 8.6.7.

8.6.13.4 Knit Post-Treated Textile Materials.

8.6.13.4.1 Five specimens from each of the two directions shall be tested.

8.6.13.4.2 Samples for conditioning shall include material that is a minimum of 75 mm × 305 mm (3 in. × 12 in.).

8.6.13.4.3 Samples shall be permitted to be obtained from yardage or finished garments.

8.6.13.4.4 Testing shall be performed as specified in 8.6.2 through 8.6.7.

8.7 Thread Heat Resistance Test.

8.7.1 Application. This test method shall apply to each type of thread used in the construction of work apparel.

8.7.2 Procedure. Specimens shall be tested to a temperature of 260°C (500°F) in accordance with ASTM D7138, *Standard Test Method to Determine Melting Temperature of Synthetic Fibers*.

N **8.7.2.1** Where garments are certified to meet only the base requirements of this standard, the thread shall be tested using either Method 1 or Method 2 as specified by the garment manufacturer.

N **8.7.2.2** Where garments are certified to meet the optional flame resistance requirements of this standard, the thread shall be tested using Method 1.

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8.7.3 Report.

8.7.3.1 The melting point of the sample unit shall be the average of the results obtained from the specimens tested and shall be recorded and reported to the nearest degree C.

8.7.3.2 The pass or fail results for each specimen tested shall be recorded and reported.

8.7.4 Interpretation. One or more thread specimens failing this test shall constitute failing performance for the thread type.

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8.8 Water Absorption Resistance Test.

8.8.1 Application.

8.8.1.1 This test method shall apply to water-resistant textiles.

8.8.2 Samples.

8.8.2.1 Samples for conditioning shall be at least 1 m (1 yd) square of each material.

8.8.2.2 If the manufacturer designates that the garments are to be washed, separate samples shall be preconditioned according to 8.1.3.1.

8.8.2.3 If the manufacturer designates that the garments are to be dry cleaned, separate samples shall be preconditioned according to 8.1.4.2.

8.8.3 Specimens.

8.8.3.1 Specimens shall be 200 mm × 200 mm (8 in. × 8 in.).

8.8.3.2 At least three specimens shall be tested.

8.8.3.3 Specimens shall be tested after the preconditioning specified in 8.8.2.2 or 8.8.2.3.

8.8.3.4 All specimens shall be conditioned as specified in 8.1.2 prior to testing.

8.8.4 Apparatus. The test apparatus shall be as specified in AATCC 42, *Water Resistance: Impact Penetration Test*, with the following modifications:

(1) A metal roller 113 mm ±6 mm (4½ in. ±¼ in.) long and weighing 1 kg (2¼ lb) shall be used.
(2) Embroidery hoops measuring 150 mm to 180 mm (6 in. to 7 in.) in diameter shall be used for mounting the specimen.

8.8.5 Procedure.

8.8.5.1 The conditioned specimen shall be securely mounted in the embroidery hoops with sufficient tension to ensure a uniformly smooth surface.

8.8.5.2 The direction of the flow of water down the specimen shall coincide with the warpwise direction of the specimen as placed on the stand.

8.8.5.3 The mounted specimen shall be placed on the block with the center of the specimen directly beneath the center of the nozzle and the plane of the surface of the specimen at a 45-degree angle with the horizontal.

8.8.5.4 A 500 mL (17 oz) volume of distilled water at a temperature of 27°C ±1°C (80°F ±2°F) shall be poured quickly into the funnel and allowed to spray onto the specimen.

8.8.5.5 The following operations shall then be executed as rapidly as possible:

(1) The specimen shall be removed from the hoops and placed between sheets of blotting paper on a flat horizontal surface.
(2) The metal roller shall be rolled quickly forward and back one time over the paper without application of any pressure other than the weight of the roller.
(3) A square 100 mm × 100 mm (4 in. × 4 in.) shall be cut out of the center of the wet portion of the specimen and weighed to the nearest 0.05 g. This weight shall be designated the "wet weight." Not more than 30 seconds shall elapse between the time the water has ceased flowing through the spray nozzle and the start of the weighing.
(4) The same 100 mm (4 in.) square shall be conditioned as specified in 8.1.2 until it has dried and reached moisture equilibrium with the surrounding standard atmosphere for textiles.
(5) Following the conditioning in 8.8.5.5, the square shall be reweighed, and this weight designated as the "dry weight."

8.8.5.6 The percent water absorption shall be calculated using the following equation: Percent water absorption = [(wet weight – dry weight)/(dry weight)] × 100.

8.8.6 Report.

8.8.6.1 The percent water absorption for each specimen shall be recorded and reported.

8.8.6.2 The average percent water absorption for all tested specimens shall be calculated and reported.

8.8.7 Interpretation. The average percent water absorption shall be used to determine pass/performance.

8.9 Insect Repellency Test.

8.9.1 Application. This test method shall apply to textile materials identified as insect repellent.

8.9.2 Samples. Samples shall be as specified in section 4.5.1 of Department of Defense GL/PD 07-13C, *Purchase Description Coat, Army Combat Uniform*.

8.9.3 Procedure. Testing and conditioning shall be as specified in section 4.5.1 of Department of Defense GL/PD 07-13C, *Purchase Description Coat, Army Combat Uniform*.

Δ **8.9.4 Report.** The individual concentration for each specimen in milligrams per square centimeter permethrin to the nearest 0.001 mg shall be reported.

8.9.5 Interpretation. Failure of an individual specimen shall constitute failure of the material.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1.2 Work apparel certified to NFPA 1975 meets the minimum thermal stability requirements as defined in 7.1.2. Garments such as fitness clothing might not meet the minimum thermal stability requirements of NFPA 1975 and should not be worn while on duty. Such garments can contribute to burn injury. These types of performance fitness clothing should also not be worn as undergarments beneath work apparel. In extreme conditions, undergarments such as socks, briefs, boxer shorts, boxer briefs, and bras made of thermally unstable materials could expose the wearer to additional burn

injury. Organizations should evaluate the potential risk that these undergarments might present.

Δ **A.1.1.5** Work apparel that are certified as compliant only with NFPA 1975 are not primary protective garments and cannot be relied on to provide protection from specific hazards, such as those encountered during structural or wildland fire fighting. Other standards are written for garments that provide primary protection for specific hazards to which fire fighters can be exposed while participating in emergency operations or training. However, compliant work apparel could also be certified to another standard for primary protective garments and thus be both a primary protective garment for the specific hazard that the other standard addresses and a work apparel that is compliant with NFPA 1975. Station/work uniforms that receive such dual certification (to NFPA 1975 and to a primary protective garment standard) would always exceed the minimum requirements of NFPA 1975. Examples of primary protective garment standards include, but are not limited to, NFPA 1951, NFPA 1977, NFPA 1994, and NFPA 1999.

Δ **A.1.1.6** The authority having jurisdiction should conduct a risk assessment and determine the level of visibility required for work apparel based on the anticipated use of such garments during these incidents. Where the AHJ anticipates visibility hazards, such as darkness, obscuration (smoke, fog, dust), and proximity to traffic, moving machinery, or heavy equipment operation, the AHJ should be aware of various types of visibility markings. In the case of personnel operating in proximity to traffic, moving machinery, or heavy equipment in operation, the AHJ needs to understand that special high-visibility markings are required by 23 CFR 655. This regulation requires that the *Manual on Uniform Traffic Control Devices* (MUTCD) be followed on all roads open to public travel. In Section 6D.03, the MUTCD specifies that all workers, including emergency responders, within the right-of-way who are exposed either to traffic or to work vehicles and construction equipment within the temporary traffic control (TTC) zone shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of ANSI/ISEA 107, *High-Visibility Safety Apparel and Accessories*. Section 6D.03 includes an option specifying that in lieu of ANSI/ISEA 107 apparel, emergency and incident responders and law enforcement personnel within the TTC zone can wear high-visibility safety apparel that meets the performance requirements of ANSI/ISEA 207, *High-Visibility Public Safety Vests*. An additional option within Section 6D.03 specifies that fire fighters and other emergency responders working within the right-of-way and engaged in emergency operations that directly expose them to flame, fire, heat, or hazardous materials can wear retroreflective turn-out gear that is specified and regulated by other organizations, such as NFPA.

Users are encouraged to conduct a wear trial and develop user findings and recommendations when dealing with work clothing elements that make claims to provide moisture management. Moisture management clothing can also be described as wicking, active transport, or similar descriptive terms that imply comfort to the wearer by moving sweat away from the body. The AHJ should be aware that it can be difficult to objectively quantify findings or such claims. User perception of comfort should be considered over such claims of moisture management.

A.1.1.9 Emergency response organizations are cautioned that accessories are not a part of the certified product but could be attached to the certified product by a means not engineered, manufactured, or authorized by the manufacturer. Emergency response organizations are cautioned that if the accessory or its means of attachment causes the structural integrity of the certified product to be compromised, the certified product might not comply with the standard for which it was designed, manufactured, and marketed. Additionally, if the accessory or its attachment means are not designed and manufactured from materials suitable for the hazardous environments of emergency incidents, the failure of the accessory or its attachment means could cause injury to the emergency responder.

Because the aftermarket for certified product accessories is so broad, fire and emergency response organizations are advised to contact both the manufacturer of the accessory and the manufacturer of the certified product and verify that the accessory and its means of attachment are suitable for use in the intended emergency response environment. Emergency response organizations should seek and receive written documentation from both the accessory manufacturer and the manufacturer of the certified product to validate the following information:

(1) The accessory for a certified product, and its attachment method, will not degrade the designed protection or performance of the certified product below the requirements of the product standard to which it was designed, manufactured, tested, and certified.
(2) The accessory, when properly attached to the certified product, shall not interfere with the operation or function of the certified product, or with the operation or function of any of the certified product's component parts.

Users are also cautioned that the means of attachment of the accessory that fail to safely and securely attach the accessory to the certified product can cause the accessory to be inadvertently dislodged from the certified product and create a risk to the wearer or other personnel in the vicinity.

N **A.1.2.2** Certain performance attributes of station work uniforms cannot be adequately assessed under controlled laboratory conditions. An example of such attributes are claims of moisture management. Many manufacturers claim moisture management properties of base-layer garments, but there is currently no standardized means of adequately assessing the impact on fire fighter safety. The impact on fire fighter safety can vary in different scenarios, depending on the primary protective clothing worn over the station work uniform.

In the 2014 edition of NFPA 1975, optional requirements for odor-resistant work apparel were included. This category was intended to address the antimicrobial properties of work apparel and used an industry-accepted test method for antimicrobial activity of apparel materials. This optional category was removed because the term *odor resistance* was not directly related to fire fighter or emergency responder safety, and additional material testing would be needed for making a true antimicrobial claim consistent with the U.S. government regulations required to support specific claims of antimicrobial performance and efficacy.

A.1.2.3 The purchaser should provide the vendor with a detailed specification for the specific performance and design criteria. In addition to the performance requirements specified in Chapter 7 and to ensure that work apparel are ordered and manufactured in a consistent manner, purchasers should consider the development of a detailed purchase specification that should include the following:

(1) Compliance of the garments with NFPA 1975.
(2) Reference item numbers for each item required by the purchase specification.
(3) Additional material/component requirements.
(4) Individual sizing. Work apparel that restricts movement or conflicts with the function of primary protective garments increases the risk of injury. ASTM F1731, *Standard Practice for Body Measurements and Sizing of Fire and Rescue Services Uniforms and Other Thermal Hazard Protective Clothing*, can be useful for sizing work apparel.
(5) Color.
(6) Number of units.
(7) Special service requirements.
(8) Pockets or emblems (number, type, and detailed description of placement).
(9) Special wrapping and packaging requirements.
(10) Shipment terms and conditions.
(11) Manufacturer's warranty.

Where the purchaser specifies additional requirements that exceed those of NFPA 1975, the purchaser should consider requiring the vendor to provide test data that demonstrate garment compliance with the additional requirements of the purchasing agreement. Test methods and test procedures should be discussed and agreed on by the purchaser and vendor as part of the specifications acceptance process.

To facilitate effective and consistent communications between the purchaser and the vendor, specific contact persons should be designated to address such issues as contract requirements, order status, delivery schedules, and problem resolution.

The purchaser should develop a coordinated system to maintain records on purchase order details and specifications, testing results for any requested performance criteria that exceeds the requirements of NFPA 1975, vendor performance, delivery schedules, and invoice inventory. The purchase specifications and the system should provide the procedures needed to address compliance or noncompliance with the purchasing contract.

A.1.3.6 Emergency services organizations (fire, hazardous materials, law enforcement, medical, skilled trades, technical rescue, USAR) should determine what requirements for use of work apparel apply in their jurisdiction. Regulations of national, state/provincial, regional/county/district, and local government occupational safety and health agencies, and policies of insurance or underwriters organizations should be studied for their application to operations conducted by the emergency services organization.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.4 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

Δ **A.3.3.7 Emblems.** Users are cautioned that patches or emblems might contribute to burn injury. Emblems or patches used on work apparel are not included in the test requirements of this standard. In particular, users are cautioned about using large emblems or patches on work apparel because these items are not required to be tested under NFPA 1975 for heat or flame resistance or stored energy.

A.3.3.9 Flame Resistance. Flame resistance can be an inherent property of the textile material, or it can be imparted by specific treatment.

A.3.3.21 Product Label. The product label is not the certification organization's label, symbol, or identifying mark; however, the certification organization's label, symbol, or identifying mark can be attached to it or be part of the product label.

A.3.3.24 Visibility Markings. Retroreflective enhancements improve night-time conspicuity, and fluorescent enhancements improve day-time conspicuity.

Δ **A.4.1.8** The NFPA, from time to time, has received complaints that certain items of fire and emergency services protective clothing or protective equipment might be carrying labels falsely identifying them as compliant with an NFPA standard. The requirement for placing the certification organization's mark on or attached to the product label is to help ensure that the purchaser can readily determine compliance of the respective product through independent third-party certification.

NFPA advises those purchasing work apparel or garments to be aware of the following:

For work apparel and garments to meet the requirements of NFPA 1975, they must be certified by an independent third-party certification organization. *In addition, the item must carry*

the label, symbol, or other identifying mark of that certification organization.

Any work apparel garment that does not bear the mark and label of an independent third-party certification organization is NOT COMPLIANT with NFPA 1975, even if the product label states that the garment is compliant.

For further information about certification and product labeling, Chapter 4 and Chapter 5 of NFPA 1975 should be referenced. Also, the definitions for *labeled* and *listed* in Section 3.2 and the definition for *certification/certified* in Section 3.3 should be reviewed.

Third-party certification is an important means of ensuring the quality of emergency services protective clothing and equipment. To be certain that an item is properly certified, labeled, and listed, the NFPA strongly recommends that prospective purchasers require appropriate evidence of certification for the specific product and model from the manufacturer before purchasing. Prospective purchasers should also contact the certification organizations and request copies of the certification organization's "list" of certified products to the appropriate NFPA standard. This "listing" is a requirement of third-party certification by this standard and is a service performed by the certification organization.

All NFPA standards on fire and emergency services protective clothing and equipment require that the item be certified by an independent third-party certification organization and, as with NFPA 1975 work apparel garments, all items of emergency services protective clothing and equipment must carry the label, symbol, or other identifying mark of that certification organization.

Any item of protective clothing or protective equipment covered by an NFPA standard that does not bear the mark and label of an independent third-party certification organization is NOT COMPLIANT with the appropriate NFPA standard, even if the product label states that the item is compliant.

A.4.2.1 The certification organization should have sufficient breadth of interest and activity so that the loss or award of a specific business contract would not be a determining factor in the financial well-being of the agency.

A.4.2.5 The contractual provisions covering certification programs should contain clauses advising the manufacturer that if requirements change the product should be brought into compliance with the new requirements by a stated effective date through a compliance review program involving all currently listed products.

Without these clauses, certifiers would not be able to move quickly to protect their name, marks, or reputation. A product safety certification program would be deficient without these contractual provisions and the administrative means to back them up.

A.4.2.6 Investigative procedures are important elements of an effective and meaningful product safety certification program. A preliminary review should be carried out on products submitted to the agency before any major testing is undertaken.

A.4.2.7.1 For further information and guidance on recall programs, see 21 CFR 7, Subpart C.

A.4.2.9 Such inspections should include, in most instances, witnessing of production tests. With certain products, the certification organization inspectors should select samples from the production line and submit them to the main laboratory for countercheck testing. With other products, purchasing samples in the open market for test purposes might be desirable.

A.4.5.4 For example, this situation exists when a product is wholly manufactured and assembled by another entity or entities for a separate entity that puts its name and label on the product (frequently called "private labeling") and markets and sells the product as its own product.

A.4.5.5 Subcontractors include, but are not limited to, a person or persons, company, firm, corporation, partnership, or other organization having an agreement with or under contract with the compliant product manufacturer to supply or assemble the compliant product or portions of the compliant product.

Δ **A.4.6.1** ISO Guide 27, *Guidelines for corrective action to be taken by a certification body in the event of misuse of its mark of conformity,* is a component of accreditation of certification organizations specified in 4.1.4 and 4.2.3 of this standard. Those paragraphs contain a mandatory reference to ISO/IEC 17065, *Conformity assessment — Requirements for bodies certifying products, processes and services,* in which ISO Guide 27 is referenced.

A.4.6.2 By definition, a hazard might involve a condition that can be imminently dangerous to the end-user. With this thought in mind, the investigation should be started immediately and completed in as timely a manner as is appropriate considering the particulars of the hazard being investigated.

A.4.6.11 The determination of the appropriate corrective action for the certification organization to initiate should take into consideration the severity of the product hazard and its potential consequences to the safety and health of end users. The scope of testing and evaluation should consider, among other things, testing to the requirements of the standard to which the product was listed as compliant, the age of the product, the type of use and conditions to which the compliant product has been exposed, care and maintenance that has been provided, the use of expertise on technical matters outside the certification organization's area of competence, and product hazards caused by circumstances not anticipated by the requirements of the applicable standard. As a guideline for determining which is more appropriate, a safety alert or a product recall, the following product hazard characteristics are provided, which are based on 42 CFR 84, Subpart E, §84.41:

(1) *Critical*: A product hazard that judgment and experience indicate is likely to result in a condition immediately hazardous to life or health (IHLH) for individuals using or depending on the compliant product. If an IHLH condition occurs, the user will sustain, or will be *likely* to sustain, an injury of a severity that could result in loss of life, or result in significant bodily injury or loss of bodily function, either immediately or at some point in the future.

(2) *Major A*: A product hazard, other than *Critical*, that is likely to result in failure to the degree that the compliant product does not provide any protection or reduces protection, *and is not detectable to the user.* The phrase *reduces protection* means the failure of specific protective design(s) or feature(s) that results in degradation of protection in advance of reasonable life expectancy to the point that continued use of the product is *likely* to cause

physical harm to the user, or where continued degradation could lead to IHLH conditions.

(3) *Major B*: A product hazard, other than *Critical* or *Major A*, that is likely to result in reduced protection and is detectable to the user. The phrase *reduces protection* means the failure of specific protective design(s) or feature(s) that results in degradation of protection in advance of reasonable life expectancy to the point that continued use of the product is *likely* to cause physical harm to the user, or where continued degradation could lead to IHLH conditions.

(4) *Minor*: A product hazard, other than *Critical, Major A*, or *Major B,* that is not likely to materially reduce the usability of the compliant product for its intended purpose or a product hazard that is a departure from the established applicable standard and has little bearing on the effective use or operation of the compliant product for its intended purpose.

Where the facts are conclusive, based on characteristics of the hazard classified as indicated previously, the certification organization should consider initiating the following corrective actions with the authorized and responsible parties:

(1) *Critical* product hazard characteristics: product recall
(2) *Major A* product hazard characteristics: product recall or safety alert, depending on the nature of the specific product hazard
(3) *Major B* product hazard characteristics: safety alert or no action, depending on the nature of the specific product hazard
(4) *Minor* product hazard characteristic: no action

N **A.5.2.2** Packaging containing the user information can consist of printed materials or instructions to access the information digitally.

Δ A.5.2.6(3) To avoid possible damage to the garment and possible reduction and loss of inherent or treated flame resistance characteristics of the garment, the manufacturer should be contacted prior to disinfecting or cleaning the garment by a method not prescribed on the product. Work apparel should not be cleaned in home washing machines. See 5.1.7 and 5.2.6 for information regarding how to identify the manufacturer and the garment.

For information on the prevention and transmission of communicable diseases and carcinogens caused by contaminated garments, see NFPA 1581 and OSHA regulation 29 CFR 1910.1030, or consult the Centers for Disease Control, the local board of public health, the American Medical Association, the U.S. Fire Administration, the Environmental Protection Agency, or the International Association of Fire Fighters.

N **A.6.1.5** Aftermarket products applied after the construction of the garment, such as insect-repellent, antimicrobial, water-repellent, and other finishes, could impact the performance and protective properties and reduce them below the requirements of this standard. Treatments could also void the manufacturer's warranty. The organization should thoroughly evaluate any potential claim by a manufacturer for an aftermarket application and consult the manufacturer of the garment as well.

A.7.2 Two separate test requirements are provided for manufacturers who wish to claim use of flame-resistant textile fabrics in their manufacture of work apparel. When the requirements found in Section 7.2 are met, additional label language is used to indicate that the garments are flame resistant.

A.7.3 For the purpose of this standard, *water resistance* is defined as "a finish or inherent property [of a fabric] that limits the absorption of water." Water resistance may also encompass other properties including water repellency and water penetration resistance. These additional test properties can be applied if other types of water resistance are required or desired for the specific work apparel item under consideration.

A.7.4 It is important that users understand that insect repellency is a finish or treatment and that performance or bite protection is likely to decline over time and after laundering.

A.8.4.1.2 Examples of major seams include but are not limited to seat seams, side seams, and inseams of pants; seat seams, side seams, inseams, yoke seams, sleeve set, and shoulder seams of coveralls; and yoke seams, side seams, sleeve set, side seams, and shoulder seams of shirts. Major seams do not include seams that do not expose the wearer's skin or undergarments when ruptured, for example, pocketing or emblem seams.

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Annex B Information on Performance Requirements and Test Methods

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 Heat and Thermal Shrinkage Resistance.

Δ B.1.1 Test Method Cited. Test method appears in Section 8.2; ASTM F2894, *Standard Test Method for Evaluation of Materials, Protective Clothing and Equipment for Heat Resistance Using a Hot Air Circulating Oven*, is used. Conditioning is by laundering per AATCC 135, *Dimensional Changes of Fabrics After Home Laundering*, (Machine Cycle 1, Wash Temperature V, Drying Procedure Ai) or dry-cleaning per Sections 9.2 and 9.3 of AATCC 158, *Dimensional Changes on Dry-Cleaning in Perchloroethylene: Machine Method.*

B.1.2 Description of Test Method. Material specimens are suspended in a forced air–circulating oven at 260°C (500°F) both before and after 25 wash/dry cycles or dry-cleaning cycles, whichever practice is specified for the material. Following a 5-minute exposure, the sample is removed and visually examined for evidence of melting, dripping, separation, or ignition. Samples that demonstrate such behavior fail the test. Material specimens are also measured and marked for size. Following the oven exposure, the dimensions of the material specimens are compared to the original dimensions.

B.1.3 Application of Test Method. The purpose of the test is to prevent materials or components that ignite, melt, drip, or separate during exposure to high heat from being used in work apparel. This test also examines what happens to a material after exposure to high temperatures. Thermal shrinkage of fabric can contribute to burn injury severity due to increased heat transfer, restriction of body movement, or the breaking open of fabric.

B.2 Thermal Stability.

Δ B.2.1 Test Method Cited. The test method appears in Section 8.3, Method 1. A modified form of ASTM D751, *Standard Test Methods for Coated Fabrics*, is used. Conditioning is by laundering per AATCC 135, *Dimensional Changes of Fabrics After Automatic Home Laundering*, (Machine Cycle 1, Wash Tempera-

ture V, Drying Procedure Ai) or dry-cleaning per Sections 9.2 and 9.3 of AATCC 158, *Dimensional Changes on Dry-Cleaning in Perchloroethylene: Machine Method.*

B.2.2 Description of Test Method. Material specimens are folded twice and pressed between glass plates that are then put in a forced air-circulating oven at 265°C (510°F) both before and after 25 wash/dry cycles or dry-cleaning cycles, whichever practice is specified for the material. Following a 6-hour exposure, the specimens between the glass plates are removed from the oven and allowed to cool. Specimens are then removed from the glass plates and evaluated for rating of resistance to blocking. The specimens are also examined for evidence of sticking to the glass plates, melting, or igniting. Samples that demonstrate such behavior fail the test.

B.2.3 Application of Test Method. The purpose of the test is to prevent the use of material that could stick to the wearer's skin or underclothing during a high heat or flame exposure.

B.3 Seam Breaking Strength.

Δ **B.3.1 Test Method Cited.** The test method appears in Section 8.4 and uses ASTM D1683/D1683M, *Standard Test Method for Failure in Sewn Seams of Woven Apparel Fabrics,* for woven fabrics or ASTM D6797, *Standard Test Method for Bursting Strength of Fabrics Constant Rate of Extension (CRE) Ball Burst Test* for knit fabrics.

B.3.2 Description of Test Method. Two different methods are used, one for woven fabrics and the second for knit fabrics. The strength of a woven material seam is measured in the same way as material tensile strength. In this test, a material seam specimen is placed between two grips in a tensile testing machine and pulled until it breaks. A burst test is used for knit seams where the material seam specimen is placed on a tensile machine with a 25 mm (1 in.) diameter ball and a circular clamp. The tensile testing machine is used to push the ball through the specimen. The force at which the specimen breaks is the seam strength. The seam strength is measured before laundering.

B.3.3 Application of the Test Method. The purpose of this test is to require a minimum seam strength of 133 N (30 lb) for seams used in stress areas of the garment.

B.4 Label Print Durability.

B.4.1 Test Method Cited. Test method appears in Section 8.5. Conditioning is by laundering per AATCC 135 (Machine Cycle 1, Wash Temperature V, Drying Procedure Ai) or dry-cleaning per Sections 9.2 and 9.3 of AATCC 158.

B.4.2 Description of Test Method. Labels must contain the required language as stated in NFPA 1975. They are subjected to 25 wash/dry cycles or dry-cleaning cycles, as appropriate for the material, and then examined for legibility.

B.4.3 Application of Test Method. This requirement checks for label durability. Following this test, the labels must remain legible from a distance of at least 305 mm (12 in.).

B.5 Optional Flame Resistance.

Δ **B.5.1 Test Method Cited.** Test method appears in Section 8.6, and ASTM D6413 is used. Conditioning is by laundering per AATCC 135 (Machine Cycle 1, Wash Temperature V, Drying Procedure Ai), or dry cleaning per Sections 9.2 and 9.3 of AATCC 158.

B.5.2 Description of Test Method. A 75 mm × 305 mm (3 in. × 12 in.) material specimen is placed in a holder that is suspended vertically over a 38 mm (1½ in.) high flame. The flame is produced by a methane gas source. The material is placed in contact with the flame at the flame's midpoint for a period of 12 seconds. After exposure to the flame, the amount of time during which the specimen continues to burn (afterflame) is recorded. The length of the burn, or char length, then is measured by attaching a weight to tear the specimen and measuring the length of the tear along the burn line. Notations are recorded if any melting or dripping is observed. Samples are tested in this manner both before and after 100 wash/dry cycles or 100 dry-cleaning cycles, whichever practice is specified for the material.

B.5.3 Application of Test Method. This test is used to determine how readily materials ignite and how long they continue to burn after removal of the ignition source. Materials cannot have an average afterflame time greater than 2 seconds, or a char length greater than 150 mm (6 in.), or exhibit any melting or dripping. Char length is an indicator of thermal stability. This test is not representative of all types of flame contact to which personnel might be exposed.

B.6 Thread Heat Resistance.

B.6.1 Test Method Cited. Test method appears in Section 8.7.

B.6.2 Description of Test Method. The referenced thread melting test method in ASTM D7138, *Standard Test Method to Determine Melting Temperature of Synthetic Fibers,* contains the following two methods for the determination of the thread or fiber melting point:

In Method 1, a specimen of fiber and a reference sample are positioned into the designated heating blocks of a differential scanning calorimetry (DSC) instrument. The instrument then increases the heat and determines the melting point of the specimen materials.

In Method 2, a small segment of thread used in the stitching of work apparel is placed in a flask containing an organic solvent and heated. (The solvent extracts substances that would interfere with the test.) Next, the extracted thread segment is put in a device that slowly heats the thread. The temperature at which the thread begins to melt is the melting temperature.

B.6.3 Application of Test Method. Thread used in work apparel must withstand temperatures of up to 260°C (500°F). If the melting temperature is less than 260°C (500°F), the thread fails the test. The temperature, 260°C (500°F), is consistent with the heat resistance test.

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B.7 Optional Water Resistance.

B.7.1 Test Method Cited. Test method appears in Section 8.8. A modified version of AATCC 42, *Water Resistance, Impact Penetration Test* is used. Conditioning is by laundering per AATCC 135, *Dimensional Changes of Fabrics After Automatic Home Laundering,* (Machine Cycle 1, Wash Temperature V, Drying Procedure Ai) or dry-cleaning per Sections 9.2 and 9.3 of AATCC 158, *Dimensional Changes on Dry-Cleaning in Perchloroethylene: Machine Method.*

B.7.2 Description of Test Method. Material specimens are sprayed with a specified amount of water after 25 wash/dry cycles or dry-cleaning cycles, whichever practice is specified for the material. Following the water spray and subsequent wringing of the fabric, the water absorption into the material is meas-