

NFPA®

2113

**Standard on
Selection, Care, Use, and
Maintenance of Flame-Resistant
Garments for Protection of
Industrial Personnel Against
Short-Duration Thermal
Exposures from Fire**

2020



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NFPA® 2113

Standard on

Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire

2020 Edition

This edition of NFPA 2113, *Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire*, was prepared by the Technical Committee on Flash Fire Protective Garments. It was issued by the Standards Council on April 28, 2019, with an effective date of May 18, 2019, and supersedes all previous editions.

This edition of NFPA 2113 was approved as an American National Standard on May 18, 2019.

Origin and Development of NFPA 2113

The NFPA Standards Council established the Technical Committee on Flash Fire Protective Garments in 1998. Between February and August of 1999, the technical committee developed two draft standards — NFPA 2112, *Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire*, and NFPA 2113 — which were then released for public proposals and comments. NFPA 2113 specified the minimum selection, care, use, and maintenance requirements for flame-resistant garments that were compliant with NFPA 2112 for use by industrial personnel in areas at risk from flash fires.

The first editions of NFPA 2112 and NFPA 2113 were approved by the NFPA membership at the May 2001 NFPA World Fire Safety Congress and were issued by the Standards Council in July 2001.

The 2007 edition included amendments to the 2001 standard. Definitions were reviewed and modified to be consistent with both NFPA 2112 and the *NFPA Glossary of Terms*. The committee also clarified elements of the hazard analysis and considerations for garment selection.

In the 2012 edition, the scope and sections pertaining to workplace hazard assessment were modified to reflect that flame-resistant garments for industrial personnel can protect against other types of short-duration flame exposure. New annex material was added that described other types and possible sources of short-duration flame exposure. The definitions were updated to be consistent with NFPA 2112 and the *NFPA Glossary of Terms*.

In the 2015 edition, the committee revised the title to better reflect the intended application for the standard, which is to address protection of industrial personnel from short-duration thermal exposures from industrial fires and not only flash fires. The committee also revised the scope and application provisions of the standard to be consistent with the broader concept of fire. In addition to modifying the scope and application requirements, the committee added a new section on responsibility to clarify that both the employer and employee have specific responsibilities for selection, care, use, cleaning, and maintenance of protective garments. Definitions of extracted terms were modified to be consistent with updated terms in the *NFPA Glossary of Terms*, and definitions for *risk* and *risk assessment* were added to correlate with the new section in Chapter 4 permitting risk assessments to be used when evaluating where flame-resistant garments should be used. Throughout the standard, the committee replaced *hazard assessment* with *hazard analysis* as a more appropriate term for the application in this standard and more consistent with industry terminology.

In the 2020 edition, changes made by the committee include adding a comprehensive definition for *biological terrorism agents* in Chapter 3 and consideration of the protection of both the hands and head by flame-resistant garments in Chapter 4.

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

Committee Scope: This Committee shall have primary responsibility for documents on the manufacture, selection, care, and use of garments and equipment used for protection of industrial personnel where there is potential for flash fire. Industrial personnel include workers who are potentially or may accidentally be exposed to hydrocarbon or combustible dust flash fires, and not electrical flashes. These documents do not cover fire fighters and other emergency services personnel.

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NFPA 2113

Standard on

Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire

2020 Edition

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

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

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

Chapter 1 Administration

1.1 Scope.

1.1.1* This standard shall specify the minimum selection, care, use, and maintenance requirements for flame-resistant garments for use by industrial personnel in areas at risk from short-duration thermal exposures from industrial fires that are compliant with NFPA 2112.

1.1.2* This standard shall not apply to protective clothing for wildland fire fighting, technical rescue, structural fire fighting, proximity fire fighting, or any other fire-fighting operations, or hazardous materials emergencies.

1.1.3 This standard shall not apply to protection from electrical flashes, radiological agents, biological agents, or hazardous materials.

1.2 Purpose. The purpose of this standard shall be to reduce the health and safety risks associated with the incorrect selection and use of flame-resistant garments and those risks associated with incorrectly maintained, contaminated, or damaged flame-resistant garments.

1.3 Application.

1.3.1* This standard shall not purport to address all the safety aspects associated with its use.

1.4 Responsibility.

1.4.1 To ensure the greatest possible protection within the organization for employees in the workplace, the cooperative efforts of both employers and employees shall establish and maintain a safe and healthy work environment.

1.4.2 As a minimum, employers shall be responsible for the following:

- (1) Performing a hazard analysis of the workplace to identify and control physical and health hazards
- (2) Identifying and providing appropriate personal protective equipment (PPE) for employees
- (3) Training employees in the use and care of PPE
- (4) Maintaining PPE, including replacing worn or damaged PPE
- (5) Periodically reviewing, updating, and evaluating the effectiveness of the PPE program

1.4.3 As a minimum, employees shall be responsible for the following:

- (1) Properly wearing PPE
- (2) Attending training sessions on PPE
- (3) Ensuring proper care, cleaning, and maintenance of PPE
- (4) Informing a supervisor of the need to repair or replace PPE

1.5 Equivalency. Nothing herein shall be intended to restrict any individual or organization from exceeding these minimum requirements.

1.6 Units. 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. 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. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 2112, *Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire*, 2018 edition.

2.3 Other Publications.

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

ASTM F1449, *Standard Guide for Industrial Laundering of Flame, Thermal, and Arc Resistant Clothing*, 2008, reapproved 2015.

ASTM F2757, *Standard Guide for Home Laundering Care and Maintenance of Flame, Thermal and Arc Resistant Clothing*, 2009, reapproved 2016.

2.3.2 CSA Group Publications. CSA Group, 178 Rexdale Boulevard, Toronto, ON M9W 1R3, Canada.

CSA Z96, *High-Visibility Safety Apparel*, 2015.

2.3.3 ISEA Publications. International Safety Equipment Association, 1901 North Moore Street, Arlington, VA 22209-1762.

ANSI/ISEA 107, *American National Standard for High-Visibility Safety Apparel and Headwear*, 2015.

2.3.4 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

NFPA 79, *Electrical Standard for Industrial Machinery*, 2018 edition.

NFPA 921, *Guide for Fire and Explosion Investigations*, 2017 edition.

NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, 2020 edition.

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

NFPA 1975, *Standard on Emergency Services Work Apparel*, 2019 edition.

NFPA 1983, *Standard on Life Safety Rope and Equipment for Emergency Services*, 2017 edition.

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

NFPA 2112, *Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire*, 2018 edition.

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* 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.

3.2.2 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.

3.2.3 Shall. Indicates a mandatory requirement.

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

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

3.3 General Definitions.

3.3.1 Agents.

3.3.1.1 Biological Terrorism Agents. Liquid or particulate agents that can consist of a biologically derived toxin or pathogen used to inflict lethal or incapacitating casualties, generally on a civilian population as a result of a terrorist attack. [1991, 2016]

3.3.1.2 Radiological Agents. Radiation associated with x-rays; alpha, beta, and gamma emissions from radioactive isotopes; or other material in excess of normal background radiation levels.

3.3.2 Body.

3.3.2.1 Lower Body. The area of the body below the waist including the legs but excluding the ankles and feet.

3.3.2.2 Upper Body. The area of the body above the waist and extending to the shoulders, including the arms and wrists but excluding the hands. [2112, 2018]

3.3.3 Care. Procedures for cleaning, decontamination, and storage of protective clothing and equipment. [1851, 2020]

3.3.4 Certification/Certified. A system whereby a certification organization determines that a manufacturer has demonstrated the ability to produce a product that complies with the requirements of this standard, authorizes the manufacturer to use a label on listed products that comply with the requirements of this standard, and establishes a follow-up program conducted by the certification organization as a check on the methods the manufacturer uses to determine continued compliance of labeled and listed products with the requirements of this standard. [1971, 2018]

3.3.5 Certification Organization. An independent, third-party organization that determines product compliance with the requirements of this standard with a labeling/listing/follow-up program. [1971, 2018]

3.3.6 Cleaning. The removal of dirt and debris.

3.3.7 Compliance/Compliant. Meeting or exceeding all applicable requirements of this standard. [1971, 2018]

3.3.8 Component(s). Any material, part, or subassembly used in the construction of the compliant product. [1971, 2018]

3.3.9 Contamination/Contaminated. The process of transferring a hazardous material from its source to people, animals, the environment, or equipment, which **could** act as a carrier.

3.3.10 Cross-Contamination. The transfer of contamination from one item to another or to the environment.

3.3.11 Decontamination. The physical and/or chemical process of reducing and preventing the spread of contamination from persons and equipment used in a contaminated environment.

3.3.12 Emblem(s). Shields, heraldry, or printing that designates 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 in a permanent manner.

3.3.13 Fabric. The one or more layers of textile material(s) used in the primary construction of protective garment(s).

3.3.14 Fire. A rapid oxidation process, which is a chemical reaction resulting in the evolution of light and heat in varying intensities. [921, 2017]

3.3.15 Fit. The quality, state, and manner in which clothing, when worn, relate to the human body.

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

Δ 3.3.17* Flash Fire. A **type of short-duration fire** that spreads by means of a flame front rapidly through a diffuse fuel, such as dust, gas, or the vapors of an ignitable liquid, without the production of damaging pressure. [2112, 2018]

3.3.18 Functionality/Functional. The ability of the flame-resistant garment or a component of the flame-resistant garment to continue to be utilized for its intended purpose.

3.3.19* Garments. Clothing including, but not limited to, coveralls, trousers, shirts, and outerwear. [2112, 2018]

N 3.3.19.1* Limited-Use Garment. A garment whose service life is limited by the manufacturer to a specified number of wear cycles.

N 3.3.19.2* Single-Use Garment. A garment designed to be used one time and then disposed of. [2112, 2018]

N 3.3.20 Glove. An item designed to provide protection to the wearer's hand and wrist. [2112, 2018]

3.3.21 Hardware. Nonfabric components of the flame-resistant garment including, but not limited to, those made of metal or plastic.

3.3.22 Hazard Analysis. The process by which an organization identifies hazards in the workplace and then determines appropriate controls, including the use of personal protective equipment (PPE), to eliminate or reduce worker exposure to those hazards.

3.3.23 Hazardous Materials. Any solid, liquid, gas, or mixture thereof that can potentially cause harm to the human body through respiration, ingestion, skin absorption, or contact.

3.3.24 Hazardous Materials Emergencies. Incidents involving the release or potential release of hazardous materials. [1971, 2018]

3.3.25 Interlining. Any textile that is incorporated into any garment as a layer between outer and inner layers. [1975, 2019]

3.3.26 Lining. Any material that is attached and used to cover or partially cover the inside surface of a flame-resistant garment.

3.3.27 Maintenance. Procedures for inspection, testing, repair, and retirement of the product.

3.3.28 Melt. A response to heat by a material resulting in evidence of flowing or dripping. [1983, 2017]

3.3.29* Organization. The entity that provides the direct management and supervision for the industrial personnel.

3.3.30* Product Label. A label or marking affixed to a product by the manufacturer that provides general information, warnings, instructions for care and maintenance, and other information.

3.3.31 Reflective Striping. Material added to the exterior of the garment to enhance nighttime or daytime visibility.

3.3.32 Reinforcement. An additional layer of a textile material applied to a specific area of the protective garment to make that portion of the protective garment more resistant to wear.

3.3.33 Retirement. The process of removing protective clothing from service.

3.3.34 Risk. A combination of the probability and the degree of possible injury or damage to health in a hazardous situation. [79, 2018]

3.3.35 Risk Assessment. An assessment of the likelihood, vulnerability, and magnitude of incidents that could result from exposure to hazards.

3.3.36 Seam. Any permanent attachment of two or more protective garment fabrics in a line formed by joining the separate material pieces.

3.3.37 Service Life. The period for which the protective clothing is useful before retirement.

N 3.3.38 Short-Duration Thermal Exposure from Fire. A period of egress from or accidental exposure to thermal events, including, but not limited to, vapor cloud fires, jet flames, liquid fires (pool fires or running liquid fires), solids fires (fires of solid materials or dust fires), or warehouse fires. [2112, 2018]

N 3.3.39* Shroud/Hood/Balaclava. An item of clothing designed to provide protection to the wearer's head or neck, or both, less the face opening. [2112, 2018]

3.3.40 Static Electricity. The acquisition and retention of electrical charge through induction (by means of corona discharge) or by triboelectric means (rubbing with another material).