

NFPA®

51B

**Standard for
Fire Prevention During
Welding, Cutting, and
Other Hot Work**

2019



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NFPA® 51B

Standard for

Fire Prevention During Welding, Cutting, and Other Hot Work

2019 Edition

This edition of NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, was prepared by the Technical Committee on Hot Work Operations. It was issued by the Standards Council on June 25, 2018, with an effective date of July 15, 2018, and supersedes all previous editions.

This edition of NFPA 51B was approved as an American National Standard on July 15, 2018.

Origin and Development of NFPA 51B

NFPA 51B was tentatively adopted at the 1960 NFPA Annual Meeting, and the first edition was adopted in 1962. Subsequent editions were published in 1971, 1976, 1977, 1984, 1989, and 1994. The 1999 edition was expanded to include other hot work operations, as defined in the document, to clarify the roles of fire watch and to introduce a defined permit authorizing individual.

The 2003 edition was modified to incorporate the following additions: a clear reference to ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, to ensure other non-fire-related hot work requirements were followed; a requirement for signs designating hot work areas as needed; further clarification in the annex of the role of fire watch and more advisory material describing management responsibilities; requirements for consideration on nonhorizontal spark or slag travel hazard; requirements and advisory material for the consideration of personal protective equipment; decision trees for when a permit is needed and when a fire watch is needed; and a new chapter, Sole Proprietors and Individual Operators, to consider one-person shops. The 2003 edition was also modified to comply with the updated *Manual of Style for NFPA Technical Committee Documents*.

The 2009 edition included a new requirement for listed and/or approved welding blankets, pads, and curtains and gave definitions of those terms; updated permit information; clarified the 35 Foot Rule; and gave alternative methods to hot work, requirements for site-specific hazard awareness by hot work contractors, and new requirements for personal protective equipment.

The 2014 edition included new definitions on designated and permitted areas. In addition to the definitions, new requirements were added to designated areas. The scope was modified to clarify that the document is also concerned with preventing injuries and not just loss of life during hot work operations. The purpose was revised to clarify that this document provides requirements and not just guidance and that it applied to all those who are involved with hot work operations. Two requirements were added: (1) for welding blankets, pads, and curtains to be both listed and approved, and (2) the maximum period for which a permit is valid is limited to a 24-hour period.

The 2019 edition includes new definitions on fire protection system, fire monitoring, and fire watch, and language was added to Chapter 5 to differentiate between fire watch and fire monitoring requirements. A requirement was added for fire extinguishers, which are referenced throughout the document, to comply with NFPA 10, *Standard for Portable Fire Extinguishers*. New annex material addresses proper preparation of areas deemed impermissible due to impaired fire protection systems, clarifies the process for reinspections of hot work areas during each shift, and provides comparisons between hot work byproduct temperatures and combustible material ignition temperatures. The permit issuance process has been reorganized to clarify the requirements, and a revision has been made to require the fire watch to be maintained for at least 1 hour (where it had been a half-hour).

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Committee Scope: This Committee shall have primary responsibility for documents on the prevention of injury, loss of life and loss of property from fire or explosion as a result of hot work. Hot work operations include, but are not limited to, cutting, welding, burning, or similar operations capable of initiating fire or explosion.

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NFPA 51B

Standard for

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2019 Edition

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

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex C. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

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

Chapter 1 Administration

1.1 Scope.

1.1.1* This standard shall cover provisions to prevent injury, loss of life, and loss of property from fire or explosion as a result of hot work.

1.1.2 Installation and operation of arc cutting and welding equipment and operation of gas cutting and welding equipment shall be in accordance with ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*.

1.2* Purpose. This standard shall provide minimum requirements for all persons who manage, request, authorize, perform, or supervise hot work.

1.3 Application.

1.3.1 This standard shall apply to the following hot work processes:

- (1) Welding and allied processes
- (2) Heat treating
- (3) Grinding
- (4) Thawing pipe
- (5) Powder-driven fasteners
- (6) Hot riveting
- (7)* Torch-applied roofing in conjunction with the requirements of NFPA 241
- (8) Similar applications producing or using a spark, flame, or heat

1.3.2 This standard shall not apply to the following:

- (1) Candles
- (2) Pyrotechnics or special effects
- (3) Cooking operations
- (4) Electric soldering irons
- (5) Design and installation of gas cutting equipment and welding equipment covered in NFPA 51
- (6) Additional requirements for hot work operations in confined spaces
- (7) Lockout/tagout procedures during hot work

1.4 Retroactivity. The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.4.1 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.4.2 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.5 Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.5.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.5.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

N 1.6 Units and Formulas.

N 1.6.1 The units of measure in this standard are presented first in U.S. customary units (inch-pound units). International System (SI) of Units follow the inch-pound units in parentheses.

N 1.6.2 Either system of units shall be acceptable for satisfying the requirements in the standard.

N 1.6.3 Users of this standard shall apply one system of units consistently and shall not alternate between units.

1.6.4 The values presented for measurements in this standard are expressed with a degree of precision appropriate for practical application and enforcement. It is not intended that the application or enforcement of these values be more precise than the precision expressed.

1.6.5 Where extracted text contains values expressed in only one system of units, the values in the extracted text have been retained without conversion to preserve the values established by the responsible technical committee in the source document.

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 10, *Standard for Portable Fire Extinguishers*, 2018 edition.

NFPA 51, *Standard for the Design and Installation of Oxygen–Fuel Gas Systems for Welding, Cutting, and Allied Processes*, 2018 edition.

NFPA 55, *Compressed Gases and Cryogenic Fluids Code*, 2016 edition.

NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*, 2018 edition.

2.3 Other Publications.

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

ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, 2012.

2.3.2 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

NFPA 1, *Fire Code*, 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* 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* 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.

3.2.4 Shall. Indicates a mandatory requirement.

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

3.2.6 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 Fire Monitoring. Provisions implemented to provide early warning of smoldering fire conditions in the hot work area following completion of the established fire watch time period.

3.3.2 Fire Protection System. Any fire alarm device or system or fire-extinguishing device or system, or combination thereof, that is designed and installed for detecting, controlling, or extinguishing a fire or otherwise alerting occupants, or the fire department, or both, that a fire has occurred. [1, 2018]

3.3.3 Fire Watch. A person or persons responsible for continuously observing the hot work area, maintaining fire-safe conditions, and responding to emergencies during hot work operations and in the established period following.

3.3.4 Hot Work. Work involving burning, welding, or a similar operation that is capable of initiating fires or explosions.

3.3.5 Management. For the purpose of hot work, all persons, including owners, contractors, educators, or designated agents, who are responsible for hot work operations.

3.3.6 Permissible Areas.

3.3.6.1 Designated Area. A specific location designed and approved for hot work operations that is maintained fire-safe, such as a maintenance shop or a detached outside location, that is of noncombustible or fire-resistive construction, essentially free of combustible and flammable contents, and suitably segregated from adjacent areas.

3.3.6.2 Permit-Required Area. Any location other than a designated area that is approved for hot work and is made fire-safe by removing or protecting combustibles from ignition sources.

3.3.7 Permit. A document issued by the AHJ for the purpose of authorizing performance of a specified activity. [1, 2018]

3.3.8* Permit Authorizing Individual (PAI). The individual designated by management to authorize hot work.

3.3.9* Welding and Allied Processes. Processes such as arc welding, oxy-fuel gas welding, open-flame soldering, brazing, thermal spraying, oxygen cutting, and arc cutting.

3.3.10* Welding Blanket. A heat-resistant fabric listed, approved, and designed to be placed in the vicinity of a hot work operation; intended for use in horizontal applications with light to moderate exposures such as that resulting from chipping, grinding, heat treating, sand blasting, and light horizontal welding; designed to protect machinery and prevent ignition of combustibles such as wood that are located adjacent to the underside of the blanket.

3.3.11* Welding Curtain. A heat-resistant fabric listed, approved, and designed to be placed in the vicinity of a hot work operation, intended for use in vertical applications with light to moderate exposures such as that resulting from chipping, grinding, heat treating, sand blasting, and light horizontal welding; designed to prevent sparks from escaping an area.

3.3.12* Welding Pads. A heat-resistant fabric listed, approved, and designed to be placed directly under a hot work operation such as welding or cutting, intended for use in horizontal applications with severe exposures such as that resulting from molten substances or heavy horizontal welding; designed to prevent the ignition of combustibles that are located adjacent to the underside of the pad.

Chapter 4 Responsibility for Hot Work

▲ **4.1* Management.** Management shall be responsible for the safe operations of hot work activity.

4.1.1 Management shall establish permissible areas for hot work.

4.1.2 Management shall designate a permit authorizing individual (PAI).

4.1.3 All equipment shall be examined to ensure it is in a safe operating condition.

4.1.4 When found to be incapable of reliable safe operation, the equipment shall be repaired by qualified personnel prior to its next use or be withdrawn from service and tagged out of service.

4.1.5 Management shall ensure that only approved apparatus, such as torches, manifolds, regulators or pressure-reducing valves, and acetylene generators, are used.

4.1.6 Management shall ensure that all individuals involved in the hot work operations, including contractors, are familiar with the provisions of this standard.

4.1.6.1 Individuals involved in hot work operations shall be trained in the safe operation of their equipment and in the safe use of the process.

4.1.6.2 Individuals involved in hot work operations shall have an awareness of the inherent risks involved and understand the emergency procedures in the event of a fire.

4.1.7 Management shall advise all contractors about site-specific flammable materials, hazardous processes or conditions, or other potential fire hazards.

4.2 Permit Authorizing Individual (PAI). In conjunction with management, the PAI shall be responsible for the safe operation of hot work activities.

4.2.1* The PAI shall consider the safety of the hot work operator and fire watch with respect to personal protective equipment (PPE) for other special hazards beyond hot work. (See Section 5.1.)

4.2.2 The PAI shall determine site-specific flammable materials, hazardous processes, or other potential fire hazards that are present or likely to be present in the work location.

4.2.3 The PAI shall ensure the protection of combustibles from ignition by the following means:

- (1)* Considering alternative methods to hot work
- (2) Moving the work to a location that is free from combustibles
- (3) If the work cannot be moved, moving the combustibles to a safe distance or having the combustibles properly shielded against ignition
- (4) Scheduling hot work so that operations that could expose combustibles to ignition are not begun during hot work operations

▲ **4.2.4** If the criteria of 4.2.3(2) through 4.2.3(4) cannot be met, hot work shall not be performed.

▲ **4.2.5** The PAI shall determine that appropriate fire protection and extinguishing equipment are located at the hot work site.

4.2.6 Where a fire watch is required (see Section 5.6), the PAI shall be responsible for ensuring that a fire watch is at the site.

4.2.7* Where a fire watch is not required, the PAI shall make a final check ½ hour after the completion of hot work operations to detect and extinguish smoldering fires.

4.3 Hot Work Operator. The hot work operator shall handle equipment safely and use it as follows so as not to endanger lives and property:

- (1) The operator shall have the PAI's approval before starting hot work operations.
- (2) All equipment shall be examined to ensure it is in a safe operating condition; if found to be incapable of reliable safe operation, the equipment shall be repaired by qualified personnel prior to its next use or be withdrawn from service.
- (3) The operator shall cease hot work operations if unsafe conditions develop and shall notify management, the area supervisor, or the PAI for reassessment of the situation.

4.4 Fire Watch.

▲ **4.4.1*** The fire watch shall be trained to recognize the inherent hazards of the work site and hot work operations.

▲ **4.4.2** The fire watch shall ensure safe conditions are maintained during hot work operations.

▲ **4.4.3** The fire watch shall have the authority to stop hot work operations if unsafe conditions develop.

4.4.4* The fire watch shall have fire-extinguishing equipment readily available and shall be trained in its use.

4.4.5 The fire watch shall be familiar with the facilities and procedures for sounding an alarm in the event of a fire.