

NFPA®

91

Standard for
Exhaust Systems for
Air Conveying of Vapors, Gases,
Mists, and Particulate Solids

2020



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NFPA® 91

Standard for

Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids

2020 Edition

This edition of NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids*, was prepared by the Technical Committee on Handling and Conveying of Dusts, Vapors, and Gases and released by the Correlating Committee on Combustible Dusts. It was issued by the Standards Council on November 4, 2019, with an effective date of November 24, 2019, and supersedes all previous editions.

This edition of NFPA 91 was approved as an American National Standard on November 24, 2019.

Origin and Development of NFPA 91

The National Fire Protection Association as early as 1899 recognized the hazards of blower and exhaust systems. Since 1900, the NFPA Committee on Blower Systems has given continuing attention to the subject. Following World War II, revisions and additions to the standard were recommended by the NFPA Committee on Blower Systems to cover various new developments in the protection of dust collecting systems and stock and refuse conveying systems, and were adopted by the NFPA at its Annual Meetings in 1946, 1947, 1948, and 1949. Editorially revised editions were published in 1959 and 1961. In 1972, Section 200 (Chapter 2) was expanded, and a new Section 500 (Chapter 5), covering systems involving plastic materials, was added. In the 1973 edition, Section 400 (Chapter 4) was completely revised. The 1983 edition was completely updated to conform with the *NFPA Manual of Style* and incorporated minor revisions in each chapter.

The 1990 edition included minor revisions to Chapter 2 including a new Figure 2-8 and Table 2-8(b). Changes were made to recognize NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*, and to remove conflicts with that standard. These changes included moving Section 5-2 and Figures 5-2 through 5-5 to Appendix A.

The Technical Committee on Blower Systems completely revised the standard for the 1992 edition, including a new title and new scope. The previous title had been *Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying*. Chapters 3 and 4 from the 1990 edition were deleted with some requirements from those chapters included in the revised and reorganized Chapter 2 and new Chapters 5, 6, and 7.

Minor changes were made to all chapters in the 1995 edition. The Committee clarified their intent that ducts can be round, oval, or rectangular. A new figure was added to show access openings for different shapes of ducts, and a new table was added in the appendix to show duct velocities for types of materials conveyed.

The 1999 edition incorporated a new scope limiting the applicability of this document to noncombustible particulate solids. The Committee on Handling and Conveying of Dusts, Vapors, and Gases became responsible for NFPA 91 and made changes consistent with the committee's other documents, NFPA 650, *Standard for Pneumatic Conveying Systems for Handling Combustible Particulate Solids*, and NFPA 654, *Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids*, that address combustible particulate solids.

In the 2004 revision, the Committee completed changes according to the Manual of Style for NFPA Technical Committee Documents and the conditions under which flammable concentrations can exceed 25 percent of the lower flammable limit (LFL) were expanded to match provisions in other NFPA documents. The design requirements for duct hanging and bracing and fire protection requirements for ducting were also updated.

The 2010 edition contained extensive revisions to Chapter 4 on exhaust system design and construction. These revisions brought requirements from the complementary document on pneumatic conveying systems, NFPA 654, to this standard for correlation and consistency. The Committee also added a new chapter on Air–Material Separators (Chapter 7) using concepts from NFPA 654. Chapter 9 was revised to be made retroactive and to establish requirements for testing frequency. Other changes were made make the standard consistent with the *Manual of Style for NFPA Technical Committee Documents*.

The 2015 edition included a revision to both the document title and the scope to remove confusion for users of NFPA 91 when designing pneumatic conveying, duct systems, or air moving devices for application within the commodity-specific combustible dust standards. With the revisions, the standard applied to particulate solids, whether combustible or noncombustible. The committee used information provided by a FM Global data sheet to include alternative methods in two applications: (1) protecting ducts that pass through fire barriers so as to maintain the fire resistance rating of the barrier and (2) strengthening ducts where sprinklers are installed and discharge within the ducts system in order to maintain support for the ducting with the accumulated weight of the discharge water. The committee added and revised definitions for consistency with the commodity-specific combustible dust standards. The committee also reviewed and updated extracted material in accordance with the *Manual of Style for NFPA Technical Committee Documents*.

The 2020 edition includes requirements for nonconductive system components and a revision to the concentration threshold for flammable or combustible materials requiring spark-resistant fans and blowers.

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Committee Scope: This Committee shall have primary responsibility for documents on the hazard identification, prevention, control, and extinguishment of fires and explosions in the design, construction, installation, operation, and maintenance of facilities and systems used in manufacturing, processing, recycling, handling, conveying, or storing combustible particulate solids, combustible metals, or hybrid mixtures.

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NFPA 91

Standard for

Exhaust Systems for Air Conveying of Vapors,
Gases, Mists, and Particulate Solids

2020 Edition

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

Chapter 1 Administration

1.1* Scope.

1.1.1 This standard provides minimum requirements for the design, construction, installation, operation, testing, and maintenance of exhaust systems for air conveying of vapors, gases, mists, and particulate solids as they relate to fire and/or explosion prevention, except as modified or amplified by other applicable NFPA standards.

1.1.2 This standard does not cover exhaust systems for conveying combustible particulate solids that are covered in other NFPA standards (see A.1.1).

1.2 Purpose. The purpose of this standard is to provide technical requirements for exhaust systems that will achieve the following results:

- (1) Provide safety to life and property from fires and explosions
- (2) Minimize the damage in the event that such fires and explosions occur

1.3 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.

1.3.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.3.2 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.

1.3.3 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.

1.4 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.

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

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

1.5 Units of Measurement. 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 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2020 edition.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2019 edition.

NFPA 68, *Standard on Explosion Protection by Deflagration Venting*, 2018 edition.

NFPA 69, *Standard on Explosion Prevention Systems*, 2019 edition.

NFPA 70®, *National Electrical Code®*, 2020 edition.

NFPA 86, *Standard for Ovens and Furnaces*, 2019 edition.

NFPA 221, *Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls*, 2018 edition.

NFPA 259, *Standard Test Method for Potential Heat of Building Materials*, 2018 edition.

NFPA 780, *Standard for the Installation of Lightning Protection Systems*, 2020 edition.