

NFPA®

1964

Standard for Spray Nozzles

2018



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NFPA® 1964

Standard for

Spray Nozzles

2018 Edition

This edition of NFPA 1964, *Standard for Spray Nozzles*, was prepared by the Technical Committee on Fire Hose. It was issued by the Standards Council on November 10, 2017, with an effective date of November 30, 2017, and supersedes all previous editions.

This edition of NFPA 1964 was approved as an American National Standard on November 30, 2017.

Origin and Development of NFPA 1964

The first edition of NFPA 1964 was adopted in 1988 based on a need for a standard that applied to portable adjustable-pattern nozzles for general fire department use and for use on hose attached to standpipes. In the second edition, the text was editorially reworked to make the document more usable, and the details of a few of the test procedures were revised to better reflect how the nozzles are used in the field. The 1998 edition allowed for rating nozzles at other than the traditional 6.9 bar (100 psi); added requirements for marine nozzles; and clarified the testing process, methods, and procedures to improve the understanding of the compliance testing required.

The 2003 edition expanded the document to cover master stream spray nozzles up to 7570 L/min (2000 gpm) in addition to handline spray nozzles. Requirements for marking nozzles were allowed to be in either SI or U.S. units. The pass/fail criteria for some tests were revised to base them on requirements for the nozzle in the standard rather than on results of previous testing. The parenthetical expression “(Shutoff and Tip)” was removed from the title of the standard. The document was completely revised for compliance with the *Manual of Style for NFPA Technical Committee Documents*, and changes were made to improve the clarity of the requirements.

The 2008 edition of this standard was a general update and review by the committee.

The 2013 edition of NFPA 1964 was edited by the Technical Committee to clarify language. The difference between *flow* and *flow rate* in comparison to discharge was made clearer to emphasize the importance of flow and flow rate factors in fire suppression. The committee also transposed measurements to put U.S. units first to reflect the format of other NFPA fire hose standards.

The 2018 edition of NFPA 1964 has many significant changes due to the fact that the committee has chosen to withdraw NFPA 1965. In doing so the committee incorporated the relevant material from 1965 into the applicable areas of NFPA 1964. The goal of this major change was to make it easier for the users of the documents to go to one document for the information on nozzles, whereas before the user would have to go to multiple documents for information on the subject.

Technical Committee on Fire Hose

Andrew D. Ellison, *Chair*
Unified Investigations and Science, MA [SE]

Jason Goodale, *Secretary*
Loveland Fire Rescue, CO [U]

Michael S. Aubuchon, Sr., North American Fire Hose Corporation, CA [M]

Bill C. Betz, Fairfax County Fire & Rescue Department, VA [U]

Christopher B. Budzinski, City of Asheville Fire Department, NC [E]

Jonathan R. Cares, Town of Londonderry Fire Rescue, NH [U]

Michael Cedrone, FM Global, RI [I]
Rep. FM Global

Thomas G. Farruggia, Illinois Fire & Safety Company, IL [IM]
Rep. National Association of Fire Equipment Distributors

Brian Fink, Fire Department City of New York, NY [E]
Rep. Fire Department City of New York

James E. Glatts, FireOne, PA [IM]

William T. Graves, William Graves Associates LLC, NJ [SE]

Sean Gray, Cobb County Fire And Emergency Services, GA [SE]

Jeff Hebenstreit, UL LLC, IL [RT]

Stephen Jackson, Waterway Hudson Valley, NY [IM]

Jayme L. Kahle, Rincon Valley Fire District, AZ [E]

Brian P. Kazmierzak, Penn Township Fire Department, IN [E]

Jonathan Larrabee, Kochek Company, Inc., CT [M]

Duane Leonhardt, Mercedes Textiles Ltd., Canada [M]
Rep. Fire Equipment Manufacturers' Association

Mark Allen Lighthill, KFH Industries, AL [M]

Michael Mayer, Task Force Tips, IN [M]

David Quick, Manchester Fire Department, NH [U]

Marc T. Radecky, FireCatt LLC, MI [IM]

Jason D. Rigenbach, IDEX Corp/Akron Brass Company, OH [M]

John D. Schreiber, Colorado Springs Fire Department, CO [U]

John W. Stacey, Glenwood, IA [E]
Rep. International Association of Fire Chiefs

Tim Vanderlip, Los Angeles County Fire Department, CA [U]

David Walsh, Boston Fire Department, MA [E]

Samuel Wu, U.S. Department of Agriculture, CA [RT]

Alternates

Jeffrey L. Benson, IDEX Corp/Akron Brass Company, OH [M]
(Alt. to Jason D. Rigenbach)

Gregg Burzine, Fire Department City of New York, NY [E]
(Alt. to Brian Fink)

Jim Ford, Waterway North Jersey, NJ [IM]
(Alt. to Stephen Jackson)

Gregory Kozey, Kochek Company, Inc., CT [M]
(Alt. to Jonathan Larrabee)

Douglas Menard, Boston Fire Department, MA [U]
(Alt. to David Walsh)

Ronald Nathan Miller, Asheville Fire Department, NC [E]
(Alt. to Christopher B. Budzinski)

Nicholas A. Nava, Exponent, MD [SE]
(Voting Alt.)

Nick Keith Proulx, Gilford, NH [U]
(Alt. to David Quick)

Jacqueline Wilmot, NFPA Staff Liaison

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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 size and design of fire hose connections, and the performance, maintenance, and selection of all types of fire hose, couplings, nozzles, and accessory equipment.

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Standard for

Spray Nozzles

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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 B. 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 B.

Chapter 1 Administration

1.1* Scope. This standard shall cover the requirements for new adjustable-pattern spray nozzles intended for general fire-fighting use, for marine and offshore platform fire-fighting use, for use with fire hoses affixed to standpipe systems, and for fire hose appliances up to and including 6 in. (150 mm) nominal dimension designed for connection to fire hose, fire apparatus, and fire hydrants intended for general fire service use in controlling or conveying water.

1.2 Purpose. The purpose of this standard shall be to provide minimum performance and operational requirements for spray nozzles and fire hose appliances and to specify the design verification tests for spray nozzles and fire hose appliances.

1.3* Application. These requirements shall apply to the following:

- (1) Manually operated basic spray, constant gallonage, and constant pressure spray nozzles whether designed as handline nozzles or master stream nozzles
- (2) Nozzles that have a rated discharge of 2000 gpm (7570 L/min) or less
- (3) Nozzles for use on Class A and Class B fires
- (4) Portable valves, including gate valves, ball valves, piston valves, butterfly valves, clappered valves, and pressure relief valves
- (5) Portable monitors, ladder pipes, and break-apart monitors
- (6) Miscellaneous hose appliances, including wyes, siamese, elbows, water curtains, water thieves, and manifolds

1.4 Equivalency.

- 1.4.1** Nothing in this standard shall 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.
- 1.4.2** Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.
- 1.4.3** The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.5* Units of Measurement. In this standard, U.S. values for measurement are followed by an equivalent in metric units. Either set of values can be used, but the same set of values (either U.S. or SI units) shall be used throughout.

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 1963, *Standard for Fire Hose Connections*, 2014 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 B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*, 2016.

ASTM D395, *Standard Test Methods for Rubber Property — Compression Set*, 2016.

ASTM D412, *Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers — Tension*, 2016.

ASTM D573, *Standard Test Method for Rubber — Deterioration in an Air Oven*, 2015.

ASTM D2565, *Standard Practice for Xenon Arc Exposure of Plastics Intended for Outdoor Applications*, 2016.

2.3.2 ISO Publications. International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandinnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

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

2.3.3 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 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 Shall. Indicates a mandatory requirement.

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

N 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.

N 3.3.1 Break-Apart Monitor. See 3.3.10.1.

3.3.2 Control.

3.3.2.1 Lever-Type Control. A control in which the handle operates along the axis of the nozzle.

3.3.2.2 Rotational-Type Control. A control that rotates in a plane perpendicular to the axis of the nozzle.

N 3.3.2.3 Trigger-Type Lever Control. A control that is actuated by a squeezing or pinching movement and features a spring-operated automatic return to the closed position.

N 3.3.3 Fire Hose Appliance. A piece of hardware (excluding nozzles) generally intended for connection to fire hose to control or convey water.

3.3.4* Flush. A nozzle feature that allows the orifice to be opened so that small debris that could otherwise be trapped in

the nozzle, causing pattern disruptions and flow rate variation, can pass through.

3.3.5 Full-Time Swivel. A connection that allows one side of the connection to swivel or rotate in relation to the other side after the connection has been tightened together.

3.3.6* Handline Nozzle. A nozzle with a rated discharge of less than 350 gpm (1325 L/min).

N 3.3.7 Ladder Pipe. A monitor that attaches to the rungs of a vehicle-mounted aerial ladder.

3.3.8* Master Stream Nozzle. A nozzle with a rated discharge of 350 gpm (1325 L/min) or greater.

N 3.3.9 Maximum Operating Pressure. The maximum pressure at which the device is designed to be operated.

N 3.3.10 Monitor. A device designed to hold and direct a nozzle while being fed by one or more hose lines or by rigid piping.

N 3.3.10.1 Break-Apart Monitor. A monitor that can be converted for use either in stationary mode on a fire apparatus or in portable mode on a separate ground base.

N 3.3.10.2 Portable Monitor. A monitor that can be lifted from a vehicle-mounted bracket and moved to an operating position on the ground by not more than two people.

N 3.3.11* Nozzle. A constricting appliance attached to the end of a fire hose or monitor to increase the water velocity and form a stream.

N 3.3.12 Portable Monitor. See 3.3.10.2.

N 3.3.13 Portable Valve. See 3.3.20.1.

3.3.14 Pressure.

N 3.3.14.1 High Pressure. Pump discharge pressure from 500 psi (3500 kPa) to less than 1100 psi (7600 kPa). [1901, 2016]

3.3.14.2* Normal Pressure. Pressure created by forces acting perpendicular to the pipe wall at the point where a pressure tap is made.

3.3.14.3* Nozzle Pressure. The normal pressure measured at the inlet of the nozzle.

3.3.14.4 Rated Pressure. The pressure at which a nozzle is designed to operate to produce a specified flow rate.

3.3.14.4.1 Maximum Rated Pressure. The maximum pressure at which the manufacturer determines it is safe to operate the nozzle.

N 3.3.14.5 Ultra-High Pressure. Pressure created by forces acting perpendicular to the pipe wall at the point where a pressure tap is made and which is greater than 1100 psi (7600 kPa).

3.3.15 Rated Discharge. The rate(s) at which a nozzle is designed to flow water when operated at its rated pressure.

N 3.3.16 Shutoff Valve. See 3.3.20.2.

N 3.3.17 Slow-Operating Valve. See 3.3.20.3.

3.3.18 Spray Nozzle. A nozzle intended for connection to a hose line or monitor to discharge water in either a spray pattern or a straight stream pattern as selected by the operator.

3.3.18.1* Basic Spray Nozzle. An adjustable-pattern spray nozzle in which the rated discharge is delivered at a designated nozzle pressure and nozzle setting.

3.3.18.2* Constant Gallonage Spray Nozzle. An adjustable-pattern spray nozzle that discharges a constant discharge rate throughout the range of patterns from a straight stream to a wide spray at a designed nozzle pressure.

3.3.18.3* Constant Pressure (Automatic) Spray Nozzle. An adjustable-pattern spray nozzle in which the pressure remains relatively constant through a range of discharge rates.

3.3.18.4* Constant/Select Gallonage Spray Nozzle. A constant discharge rate spray nozzle with a feature that allows manual adjustment of the orifice to effect a predetermined discharge rate while the nozzle is flowing.

3.3.19 Standpipe System. An arrangement of piping, valves, hose connections, and allied equipment installed in a building or structure such that, when supplied with adequate water, allows attached hose lines to be used to extinguish a fire.

N 3.3.20 Valve.

N 3.3.20.1 Portable Valve. A fire hose appliance that includes at least one valve and has fire hose connections on both inlet(s) and outlet(s).

N 3.3.20.2* Shutoff Valve. A valve whose primary function is to operate in either a fully shutoff or a fully open condition.

N 3.3.20.3 Slow-Operating Valve. A valve that has a mechanism to prevent movement of the flow-regulating element from the fully closed position to the fully opened position or vice versa in less than 3 seconds. [1901, 2016]

Chapter 4 Operational Design Requirements

4.1 Flow Rate Performance.

4.1.1* The nozzle rating shall be expressed as a rated discharge at a rated pressure [e.g., 60 gpm at 100 psi (225 L/min at 6.9 bar)].

4.1.2 Basic spray nozzles shall flow no less than the rated discharge and no more than 10 percent over the rated discharge at the rated pressure when tested in accordance with Section 6.1.

4.1.3 Constant gallonage spray nozzles shall flow no less than the rated discharge at the rated pressure and no more than 10 percent over the rated discharge at the rated pressure when tested in accordance with Section 6.1.

4.1.4 Constant/select gallonage spray nozzles shall meet the requirements of 4.1.3 at each predetermined discharge rate.

4.1.5 Constant pressure (automatic) spray nozzles shall maintain their rated pressure ± 15 psi (± 1 bar) throughout the rated discharge range when tested in accordance with Section 6.1.

4.2 Discharge Pattern.

4.2.1 Spray nozzles shall be capable of developing discharge patterns varying from straight stream to at least 100 degrees spray angle.

4.2.2 The straight stream pattern setting shall provide a cohesive jet capable of delivering 90 percent of the rated discharge within a circle 12 in. (305 mm) in diameter at a distance of 10 ft (3 m) from the nozzle if the nozzle's rated discharge is less than 350 gpm (1325 L/min), and within a circle 15 in. (381 mm) in diameter at a distance of 10 ft (3 m) from the nozzle if the nozzle's rated discharge is 350 gpm (1325 L/min) or greater.

4.2.3* Spray pattern settings shall provide a full and uniform spray pattern.

4.3* Spray Nozzle Controls.

4.3.1 If the spray nozzle is designed to be used on a handline, the nozzle shall have a water discharge control capable of functions ranging from full discharge to complete shutoff of the nozzle discharge. This control device shall be permitted to be a permanently mounted valve or a break-apart shutoff butt assembly.

4.3.2 Nozzles equipped with a lever-operated shutoff handle shall be in the closed position when the handle is closest to the discharge end of the nozzle.

4.3.3 Nozzles equipped with a linear-acting pattern control lever or handle shall be in the straight stream position when the handle is closest to the discharge end of the nozzle.

4.3.4 Rotational controls shall traverse from a wide angle spray pattern to narrow spray, to straight stream, and to shutoff position on nozzles so equipped, in a clockwise manner, when viewed from the rear of the nozzle.

4.3.5 Trigger-type lever controls shall be in the open position when squeezed and the closed position when released.

4.3.6 Lever-type controls shall require a force of no more than 16 lbf (71.2 N) and no less than 3 lbf (13.4 N) to open or close the shutoff or to adjust the stream pattern when tested in accordance with 6.3.1.

4.3.7 For rotational-type controls, the operational force required to change the pattern setting and change the flow rate, as well as to just close (without discharge), to fully close, to just open (leak), and to fully open the valve, shall not exceed 40 lbf (178 N) and shall not be less than 3 lbf (13.4 N) when tested in accordance with 6.3.2 and 6.3.4.

4.3.8* All controls for nozzle functions such as pattern selection, flush, flow rate adjustments, and shutoff shall operate with a force not greater than 25 percent over the maximum allowed at 100 psi (6.9 bar) after the entire nozzle has been subjected to a pressure of the higher of either 300 psi (20.7 bar) or one and one-half times the maximum rated pressure for 3 minutes.

4.3.9 Full-Time Swivel.

4.3.9.1 Nozzles equipped with a full-time swivel shall require a minimum force of 10 lbf (44.5 N) to rotate the nozzle when tested in accordance with 6.3.3.

4.3.9.2 Nozzles equipped with both rotational pattern controls and a full-time swivel shall have the force required to rotate the full-time swivel at least 1 lbf (4.5 N) greater than the force required to rotate the pattern control, as defined in 4.3.7.