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Standard Specification for Fire Hose Nozzles[1]

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1. Scope

1.1 This specification covers the design, manufacture, and testing of fire hose nozzles intended for use with sea water or fresh water either in straight stream or adjustable spray patterns.

1.2 The values stated in SI units are to be regarded as the standard.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A313/A313M Specification for Stainless Steel Spring Wire
A580/A580M Specification for Stainless Steel Wire
A582/A582M Specification for Free-Machining Stainless Steel Bars
B117 Practice for Operating Salt Spray (Fog) Apparatus
D395 Test Methods for Rubber Property—Compression Set
D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
D572 Test Method for Rubber—Deterioration by Heat and Oxygen
D1193 Specification for Reagent Water

2.2 *NFPA Standards:*[3]

NFPA 1963 Standards for Screw Threads and Gaskets for Fire Hose Connections

3. Terminology

3.1 *Definitions:*

3.1.1 *ball shut-off*—a spray nozzle configuration that stops the flow of water through the nozzle by rotating the ball through which the water flows so that the passage no longer aligns with the nozzle flow passage.

3.1.2 *break apart*—a feature that allows the nozzle tip to be disconnected from the nozzle body by virtue of a coupling identical to that on the hose end of the nozzle.

3.1.3 *constant flow rate spray nozzle*—an adjustable pattern nozzle in which the flow is delivered at a designed nozzle pressure. At the rated pressure, the nozzle will deliver a constant flow rate from straight stream through a wide angle pattern. This is accomplished by maintaining a constant orifice size during flow pattern adjustment.

3.1.4 *constant pressure (automatic) spray nozzle*—an adjustable pattern nozzle in which the pressure remains constant through a range of flows rates. The constant pressure provides the velocity for an effective stream reach at various flow rates. This is accomplished by means of a pressure-activated, self-adjusting orifice baffle.

3.1.5 *constant/select flow rate feature*—a nozzle feature that allows on-site adjustment of the orifice to change the flow rate to a predetermined value. The flow rate remains constant throughout the range of pattern selection from straight stream to wide angle spray.

3.1.6 *free swivel coupling*—a coupling between the nozzle and hose or between halves of a break-apart nozzle that is capable of being turned readily by hand; that is, a spanner wrench is not required to tighten the coupling to prevent leakage.

3.1.7 *flush*—a feature in a nozzle that allows the orifice to be opened so that small debris that might otherwise be trapped in the nozzle, causing pattern disruptions and flow variation, can pass through. When the flush feature is engaged, the nozzle pressure will drop and the pattern will deteriorate.

3.1.8 *lever-type control*—a control in which the handle operates along the axis of the nozzle.

3.1.9 *pistol grip*—a feature usually available as an attachment that allows a nozzle to be held like a pistol.

3.1.10 *rated pressure*—that pressure for which the nozzle is designed to operate at a specified flow rate(s).

3.1.11 *rotational-type control*—a control that rotates in a plane perpendicular to the axis of the nozzle.

4. Classification

4.1 Marine fire hose nozzles may be classified into four general construction types, as follows:

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, http://www.nfpa.org.

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4.1.1 *Type I*—Pistol grip, lever-type control operated.
4.1.2 *Type II*—Nonpistol grip, lever-type control operated.
4.1.3 *Type III*—Break apart, pistol grip, lever-type control operated.
4.1.4 *Type IV*—Break apart, nonpistol grip, lever-type control operated.

4.2 Nozzle types may be subdivided into three general classes, as follows:
4.2.1 *Class I*—Constant flow rate.
4.2.2 *Class II*—Constant/select flow rate.
4.2.3 *Class III*—Constant pressure.

4.3 Classes may be subdivided into two general sizes, as follows:
4.3.1 *Size 38 mm,* with free swivel base.
4.3.2 *Size 64 mm,* with free swivel base.

5. Ordering Information

5.1 The following shall be specified when ordering:
5.1.1 Quantity,
5.1.2 Type (see 4.1),
5.1.3 Class (see 4.2),
5.1.4 Size (see 4.3),
5.1.5 Material (see 6.1.2, 9.8.1 and 12)[4]
5.1.6 Thread type[5]

6. Materials and Manufacture

6.1 *Materials:*
6.1.1 All nozzle components and parts must be durable and demonstrate satisfactory operation during all performance tests in Section 9.
6.1.2 The nozzle body and any metal used in the construction of any part of the nozzle shall be corrosion resistant. Copper alloys containing more than 15 % zinc are prohibited in all parts that are in contact with the fluid flow. No aluminum alloys may be used except for nozzles being operated exclusively with fresh water. No ferrous material may be used except for the Type 300 series stainless steel for wire and springs in accordance with Specifications A313/A313M or A580/A580M and for screws and pins in accordance with Specification A582/A582M.
6.1.3 All nonmetallic materials or synthetic elastomers used to form a seal or gasket shall have the following properties:
6.1.3.1 uniform dimensions,
6.1.3.2 be of such size, shape, and resiliency as to withstand ordinary usage and foreign matter carried by water, including petrochemical solvents and high alkaline solutions such as those used for cleaning nozzles (see 6.2), and
6.1.3.3 be able to withstand ozone and ultraviolet light exposure if used on the external portion of the nozzle.
6.1.4 All materials shall have tensile set of not more than 5 mm as determined in accordance with 6.2.1, and compression set not more than 15 % as determined in accordance with 6.2.2.

6.2 *Specific Requirements for Rubber Sealing Materials:*

6.2.1 *Tensile Strength, Ultimate Elongation, and Tensile Set Tests:*
6.2.1.1 Tensile strength, ultimate elongation, and tensile set shall be determined in accordance with Test Methods D412, Method A, except that, for tensile set determinations, the elongation shall be maintained for only 3 min, and the tensile set shall be measured 3 min after release of the specimen. The elongation of a specimen for a tensile set determination is to be such that the bench marks 25 mm apart become separated to a distance of 76 mm.
6.2.1.2 If a specimen breaks outside the bench marks, or if either the measured tensile strength or ultimate elongation of the specimen is less than the required value, an additional specimen shall be tested, and those results shall be considered final. Results of tests for specimens that break in the curved portion just outside the bench marks may be accepted if the measured strength and elongation values are within the minimum requirements.
6.2.2 *Compression Set Test:*
6.2.2.1 Type I specimens of the material shall be prepared and the test conducted in accordance with Test Methods D395, Method B. The specimens shall be exposed for 22 h at 22°C.
6.2.3 *Accelerated Aging Test:*
6.2.3.1 Specimens shall be prepared in the same manner as for tensile strength and ultimate elongation and ultimate elongation tests, except for the bench marks 25 mm apart that shall be stamped on the specimen after the test exposure. The exposure shall be conducted in accordance with Test Method D572.
6.2.3.2 All materials must retain not less than 70 % of the as-received tensile strength and ultimate elongation after the accelerated aging test.
6.2.4 Silicone rubber (rubber having polyorganosiloxane as its characteristic constituent) shall have a tensile strength of not less than 3.5 MPa and at least 100 % ultimate elongation as determined in accordance with 9.3.2.
6.2.5 Sealing material other than silicone rubber shall have a tensile strength of not less than 10 MPa and at least 200 % ultimate elongation as determined in accordance with 6.2.1.

7. Configuration

7.1 All nozzles shall consist of the following components and design:
7.1.1 Nozzle body,
7.1.2 Free swivel coupling,
7.1.3 Shutoffs,
7.1.4 Shutoff seats,
7.1.5 Shutoff handle,
7.1.6 Bumper guard,
7.1.7 Seals,
7.1.8 Flushing feature,
7.1.9 Pistol grip (optional), and
7.1.10 Break apart feature (optional).

7.2 Nozzles shall be provided with a lever-type control shutoff handle which shall be in the closed position when the handle is closest to the discharge end of the nozzle. Lever-type control of the flow rate must also be by means of the shutoff handle.

[4] Nozzle material should be galvanically compatible with the intended fire hose couplings.
[5] Threads should conform to a recognized industry standard such as NFPA 1963.

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