UL 2351

STANDARD FOR SAFETY

Spray Nozzles for Fire-Protection Service

UL Standard for Safety for Spray Nozzles for Fire-Protection Service, UL 2351

Second Edition, Dated June 4, 2004

Summary of Topics

These revision to ANSI/UL 2351 is a reaffirmation and continuance of the Second Edition of the Standard for Spray Nozzles for Fire-Protection Service as an American National Standard.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin. Changes in requirements are marked with a vertical line in the margin and are followed by an effective date note indicating the date of publication or the date on which the changed requirement becomes effective.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated August 10, 2018.

The following table lists the future effective dates with the corresponding reference.

Future Effective Dates	References
June 3, 2016	19.1, 25A.1, 25A.2, 27.2, and 31.1

JUNE 4, 2004
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UL 2351

Standard for Spray Nozzles for Fire-Protection Service

First Edition – July, 2000

Second Edition

June 4, 2004

This ANSI/UL Standard for Safety consists of the Second edition including revisions through October 2, 2018.

The most recent designation of ANSI/UL 2351 as a Reaffirmed American National Standard (ANS) occurred on October 2, 2018. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover automatic and non-automatic (open) type water spray nozzles for installation in accordance with the Standard for Installation of Sprinkler Systems, NFPA 13, and the Standard for Water Spray Fixed Systems for Fire Protection, NFPA 15.

1.2 Nozzles are categorized by the discharge coefficient ″K″ of the orifice, water discharge angle or pattern, type of coating or plating, and other factors that have a bearing on their application. Automatic nozzles are also categorized by operating temperature rating.

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the requirements for that component.

2.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

2.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

5 Glossary

5.1 For the purpose of this standard the following definitions apply:

5.2 AUTOMATIC NOZZLE – A nozzle intended to open automatically by operation of a heat-responsive element that maintains the discharge orifice closed by means such as the exertion of force on a cap (button or disc). A nozzle is installed on piping so that a spray of water is discharged in a specific pattern for suppression or control of fires, or protection from fire exposure.

5.3 COATED, PAINTED, OR PLATED NOZZLE – A nozzle that has factory applied coatings, paint, or platings for corrosion protection or decorative purposes.

5.4 DISCHARGE COEFFICIENT "K" – Coefficient of discharge in the formula:

$$K = \frac{Q}{\sqrt{P}}$$

in which:

Q is the flow in gallons per minute, and

P is the pressure in pounds per square inch gauge (psig).

In SI units:

Q is the flow in liters per minute; and

p is the pressure in bar

5.4 revised June 3, 2014

5.5 DISCHARGE PRESSURE RANGE – The pressure range corresponding to the specified minimum and maximum pressures at which the spray nozzle is intended to be discharged.

5.6 HEAT RESPONSIVE ELEMENT – That portion of an automatic nozzle that breaks, melts, or otherwise functions to initiate the automatic operation of the nozzle when exposed to sufficient heat.

5.7 MANUAL MEANS OF ACTUATION – A means of system actuation in which the system operator initiates system discharge.

5.8 NON-AUTOMATIC (OPEN) NOZZLE – A nozzle that discharges water immediately when water is supplied from the water control valve. A non-automatic nozzle may be an automatic nozzle with the heat responsive and activating elements removed. The discharge orifice is open.

5.9 OPERATING TEMPERATURE – The temperature at which the heat responsive element of a nozzle operates when subjected to a 1°F (0.5°C) per minute temperature rise while immersed in a liquid bath.

5.10 ORIFICE – The outlet that controls the amount of water discharged from a nozzle at a given pressure.

5.11 QUICK RESPONSE (QR) NOZZLE – A nozzle that complies with the applicable requirements for such nozzles in the Sensitivity Tests, Section 21.

CONSTRUCTION

6 General

6.1 An automatic nozzle shall be constructed to effect closure of its water seat for extended periods of time without leakage and to open as intended and release all parts as specified in this standard. The closure of the water seat shall not be achieved by the use of a dynamic O-ring or similar seal (an O-ring or similar seal that moves during operation or is in contact with a component that moves during operation).

6.1 revised February 24, 2009

6.2 Stampings shall show no cracking or splitting and shall be uniformly smooth and cleanly cut.

6.3 An automatic nozzle shall be chemically or mechanically staked to maintain the manufacturer's assembly load. The assembly load shall not be able to be changed by the use of common hand tools without causing visible damage to the nozzle.

6.4 Nozzle types or materials not anticipated by these requirements require additional evaluation, such as tests to investigate special metallic or nonmetallic materials.

6.5 Sample spray nozzles are to be constructed in accordance with the manufacturer's detailed drawings including materials, dimensions, and tolerances.

6.6 For nozzles incorporating a glass bulb heat responsive element, the filling end tip of the bulb shall be completely encased in an enclosure to minimize the potential for breakage or damage.

6.6 added June 3, 2014

7 Inlet Threads

7.1 Nozzles shall be provided with not less than 1/4 inch external NPT pipe threads at the inlet that comply with the Standard for Pipe Threads, General Purpose (Inch), ASME B1.20.1.

Exception No. 1: Nozzles intended for use in installations where fittings incorporate other than NPT threads, shall be permitted with pipe threads complying with a national pipe thread standard compatible with those fittings.

Exception No. 2: Nozzle inlets intended for attachment to piping by means other than threads are able to be used when the nozzles are intended to be attached in a manner that does not involve welding and that permits nozzle removal from the piping without the use of special tools or torch cutting equipment.

Revised 7.1 effective February 24, 2011

Table 7.1
Discharge coefficient ″K″ and thread-type

Table 7.1 deleted effective February 24, 2011

7.2 Threads shall be cleanly cut and true and free from burrs, scoring, or chatter marks.

8 Temperature Ratings

8.1 The temperature ratings, temperature classifications, and color coding of automatic spray nozzles shall be as specified in Table 8.1. The frame arms of the automatic spray nozzles or glass bulb heat responsive element shall be colored according to the color code specified in Table 8.1.

8.1 revised February 24, 2009

Table 8.1
Temperature classification ratings and color coding

Table 8.1 revised June 3, 2014

Temperature classification	Temperature rating		Color coded		Maximum ambient temperature	
	°F	(°C)	Frame arms	glass bulb	°F	(°C)
Ordinary	135 – 170	(57 – 77)	Uncolored or Black	Orange -135°F (57°C) or Red -155°F (68°C)	100	(38)
Intermediate	175 – 225	(79 – 107)	White	Yellow -175°F (79°C) or Green -200°F (93°C)	150	(66)
High	250 – 300	(121 – 149)	Blue	Blue	225	(107)
Extra High	325 – 375	(163 – 191)	Red	Purple	300	(149)
Very Extra High	400 – 475	(204 – 246)	Green	Black	375	(191)
Ultra High	500 – 575	(260 – 302)	Orange	Black	475	(246)