UL 346

STANDARD FOR SAFETY

Waterflow Indicators for Fire Protective Signaling Systems

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UL Standard for Safety for Waterflow Indicators for Fire Protective Signaling Systems, UL 346

Fifth Edition, Dated June 30, 2005

Summary of Topics

This revision to ANSI/UL 346 dated September 20, 2019 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

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.

The requirements are substantially in accordance with Proposal(s) on this subject dated July 19, 2019.

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Fifth Edition

June 30, 2005

This ANSI/UL Standard for Safety consists of the Fifth Edition including revisions through September 20, 2019.

The most recent designation of ANSI/UL 346 as a Reaffirmed American National Standard (ANS) occurred on September 20, 2019. 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 vane type waterflow indicators intended for use in fire protective signaling systems to be employed in ordinary indoor locations, in accordance with the National Fire Alarm Code, NFPA 72.

1.2 Waterflow indicators covered by these requirements include sizes 3/4 inch and larger. The indicator sizes refer to the nominal inside diameter of the main sprinkler pipe or tubing on which they are installed.

1.3 A vane type waterflow indicator is an assembly of a mechanism having electrical contacts arranged to transmit a coded or noncoded signal when the vane, located in the supply pipe (riser) of a sprinkler system, is moved by the flow of water in the pipe. This flow is normally caused by the opening of one or more sprinkler heads resulting from a fire condition. The signaling contacts are intended to be connected to circuits of private fire protective signaling systems.

1.4 These requirements do not cover pressure-operated waterflow indicators.

2 General

2.1 Units of measurement

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

2.2 Components

2.2.1 Except as indicated in 2.2.2, a component of a product covered by this standard shall comply with the requirements for that component.

2.2.2 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.

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

2.2.4 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.

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2.3 Undated references

2.3.1 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.

3 Glossary

3.1 For the purpose of this standard, the following definitions apply.

3.2 The following abbreviations are used throughout this standard:

ASTM – American Society for Testing and Materials

AWG – American Wire Gauge

NFPA– National Fire Protection Association

psig – pounds per square inch gauge

3.3 ELECTRICAL CIRCUITS:

a) LOW-VOLTAGE CIRCUIT – A circuit classified as low-voltage is one involving a potential of not more than 30 volts alternating current (42.4 volts ac peak or direct current), and supplied from a circuit whose power is limited to a maximum of 100 volt-amperes (VA).

b) HIGH-VOLTAGE CIRCUIT – A circuit classified as high-voltage is one having circuit characteristics in excess of those of a low-voltage circuit.

3.4 RETARD TIME – The elapsed time in seconds between the initial movement of the vane resulting from the flow of a discrete amount of water and the actual transmission of an alarm signal.

3.5 SENSITIVITY – The minimum rate-of-flow from a system outlet, expressed in gallons per minute (gpm), which will cause the device to send an alarm signal.

3.6 SLIGHT WEEPING – Leakage not exceeding 1 fluid ounce (29.6 cm^3) per hour per linear inch of pipe diameter.

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CONSTRUCTION

4 General

4.1 Installation

4.1.1 A vane type waterflow indicator shall be so constructed that it will be suitable for connection to control units, electrically actuated transmitters, or similar units which will permit its application in conformity with applicable standards of the National Fire Protection Association (NFPA).

4.1.2 Waterflow indicators are required to be easily installed using tools ordinarily used by pipe fitters in the installation of sprinkler system devices.

4.2 Retard feature

4.2.1 If a retard feature is provided on a waterflow indicator, it shall be readily adjustable in accordance with the manufacturer's instructions and shall be marked with an appropriate scale or equivalent and an indication of the direction of time delay on the device or adjacent to it. If the retard can be adjusted for a greater than 90 second delay, a mechanical stop shall be provided to limit the delay to 90 seconds.

4.3 Working pressures

4.3.1 A waterflow indicator shall be constructed for a maximum working pressure of 175 psig (1.21 MPa) unless specifically indicated otherwise on the device.

4.4 Mounting positions

4.4.1 A waterflow indicator may be constructed to operate as intended when installed in the horizontal position only, or the vertical position only, or it may be constructed to operate in both of these positions. An indicator intended for mounting only in one position, shall be marked to indicate that position.

5 Enclosure

5.1 General

5.1.1 The enclosure of a waterflow indicator shall be formed and assembled so that it has the strength and rigidity necessary to resist the abuses to which it is likely to be subjected in service without impairing its operation due to total or partial collapse with resulting reduction of spacings, or loosening, or displacement of parts.

5.1.2 All electrical parts of a waterflow indicator shall be enclosed to provide protection against contact with uninsulated live parts.

5.1.3 The enclosure of a waterflow indicator shall be provided with means for mounting in the intended manner. Any fittings, such as brackets, hangers, or the like, necessary for the intended mounting shall be furnished with the unit. The mounting means shall be accessible without disassembling any operating part of the indicator.

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5.1.4 An enclosure shall have provision for the connection of metal-clad cable, conduit, or nonmetallic sheathed cable.

Exception: An enclosure without such provision may be acceptable if definite instructions are furnished with it indicating the sections of the waterflow indicator which are intended to be drilled in the field for the connection of raceways, or if the unit is intended for mounting on an outlet box.

5.2 Cast metal enclosures

5.2.1 The thickness of cast metal for an enclosure shall be as indicated in Table 5.1.

Table 5.1
Cast-metal enclosures

Use, or dimensions of area involved	Minimum thickness, inch (mm)[a]			
	Die-cast metal		Cast metal of other than the die-cast type	
Area of 24 square inches (155 cm^2) or less and having no dimension greater than 6 inches (152 mm)	1/16	(1.6)	1/8	(3.2)
Area greater than 24 square inches or having any dimension greater than 6 inches	3/32	(2.4)	1/8	(3.2)
At a threaded conduit hole	1/4	(6.4)	1/4	(6.4)
At an unthreaded conduit hole	1/8	(3.2)	1/8	(3.2)

[a] Cast metal having a thickness 1/32 inch (0.8 mm) less than that indicated may be employed if the surface under consideration is curved, ribbed or otherwise reinforced, or if the shape or size or both of the surface is such that equivalent mechanical strength is provided.

5.2.2 If threads for the connection of conduit are tapped all the way through a hole in an enclosure wall, or if an equivalent construction is employed, there shall be not less than 3-1/2 nor more than five threads in the metal, and the construction shall be such that a standard conduit bushing can be properly attached.

5.2.3 If threads for the connection of conduit are tapped part way through a hole in an enclosure wall, there shall be not less than five full threads in the metal, and there shall be a smooth, rounded conduit stop of inside diameter equal to that specified for the standard conduit bushing of the appropriate size for the protection of the conductors.

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5.3 Sheet metal enclosures

5.3.1 The thickness of sheet metal employed for the enclosure of a waterflow indicator shall be not less than that indicated in Table 5.2, except that sheet metal of two gauge sizes less in thickness may be employed if the surface under consideration is curved, ribbed, or otherwise reinforced, or if the shape and/or size of the surface is such that adequate mechanical strength is provided.

Table 5.2
Sheet metal enclosures

Maximum dimensions of enclosure				Minimum thickness of sheet metal								
				Steel						Brass or aluminum		
Length or width,		Area,		Zinc-coated,			Uncoated,					
inches	(mm)	inches^2	(cm^2)	inch	(mm)	GSG	inch	(mm)	MSG	inch	(mm)	AWG
12	(305)	90	(581)	0.034	(0.86)	20	0.032	(0.81)	20	0.045	(1.14)	16
24	(610)	360	(2322)	0.045	(1.14)	18	0.042	(1.07)	18	0.058	(1.47)	14

5.3.2 At any point where conduit or metal-clad cable is to be attached, sheet metal shall be of such thickness or shall be so formed or reinforced that it will have stiffness at least equivalent to that of an uncoated flat sheet of steel having a minimum thickness of 0.053 inch (1.35 mm) and the construction shall be such that a standard conduit bushing can be attached.

5.3.3 A plate or plug for an unused conduit opening or other hole in the enclosure shall be not less than 0.027 inch (0.66 mm) thick steel or 0.032 inch (0.81 mm) nonferrous metal.

5.3.4 A closure for a larger hole shall have a thickness equal to that required for the enclosure of the device or a standard knockout seal shall be used. Such plates or plugs shall be securely mounted.

5.3.5 A knockout in a sheet metal enclosure shall be reliably secured but shall be capable of being removed without undue deformation of the enclosure.

5.3.6 A knockout shall be provided with a flat surrounding surface adequate for proper seating of a conduit bushing, and shall be so located that installation of a bushing at any knockout likely to be used during installation will not result in spacings between uninsulated live parts and the bushing of less than the requirements in this standard. See Spacings, Section 13.

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5.4 Nonmetallic enclosures

5.4.1 An enclosure or parts of an enclosure of nonmetallic material shall have the mechanical strength and durability and be so formed that operating parts will be protected against damage. The enclosure parts shall resist the abuses likely to be encountered during installation and normal use and service, but in any case, the mechanical strength shall be at least equivalent to a sheet metal enclosure of the minimum thickness specified in Table 5.2.

5.4.2 Nonmetallic material shall not be employed for parts of an enclosure of waterflow indicators which are intended to be connected directly to rigid conduit or metal-clad cable or which are subject to abnormal mechanical stresses or pressures. It may be employed as an enclosure cover or an internal dust cover.

5.4.3 Among the factors taken into consideration when judging the acceptability of a nonmetallic enclosure are mechanical strength, resistance to impact, moisture absorptive properties, flammability and resistance to ignition from electrical sources, dielectric strength, insulation resistance, and resistance to arc tracking, and resistance to distortion and creeping at temperatures to which the material may be subjected under conditions of normal or abnormal usage. All these factors are considered with respect to aging.

6 Electric Shock

6.1 Any part that is exposed only during operator servicing shall not present the risk of electric shock. See Electric Shock Current Test, Section 23.

6.2 Each terminal provided for the connection of an external antenna shall be conductively connected to the supply circuit grounded conductor. The conductive connection shall have a maximum resistance of 5.2 megohms, a minimum wattage rating of 1/2 watt, and shall be effective with the power switch in either the on or off position.

Exception No. 1: The conductive connection need not be provided if:

a) Such a connection is established in the event of electrical breakdown of the antenna isolating means,

b) The breakdown does not result in a risk of electric shock, and

c) In a construction employing an isolating power transformer, the resistance of the conductive connection between the supply circuit and chassis does not exceed 5.2 megohms.

Exception No. 2: A component comprised of a capacitor with a built-in shunt resistor that complies with the requirements for antenna isolating capacitors may be rated 1/4 watt or more.

6.3 The maximum value of 5.2 megohms mentioned in 6.2 is to include the maximum tolerance of the resistor value used; that is, a resistor rated 4.2 megohms with 20 percent tolerance or a resistor rated 4.7 megohms with a 10 percent tolerance is acceptable.

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6.4 The insertion of any socket of any vacuum tube or its glass or metal equivalent of like designation used in the product shall not result in a risk of electric shock.

7 Drain Holes

7.1 A drain hole at least 1/16 inch (1.6 mm) in diameter shall be provided for each position at the lowest point in the enclosure to drain off any water that may enter the compartment. If the device can be mounted in more than one position, a drain hole shall be provided for each position.

8 Protection Against Corrosion

8.1 An iron or steel part shall be protected against corrosion by enameling, galvanizing, plating, or other equivalent means.

8.2 The requirement of 8.1 applies to an enclosure, whether of sheet steel or cast iron, and to a spring or other part upon which mechanical operation may depend. It does not apply to a minor part, such as a washer, screw, bolt, and the like, if the failure of the unprotected part would not be likely to result in a risk of fire, electric shock, or unintentional contact with moving parts that involve a risk of injury to persons, or impair the operation of the indicator. A part made of stainless steel having corrosion resistance at least equivalent to AISI Type 416 stainless steel does not require additional protection. Bearing surfaces shall be of such materials so as to reduce the likelihood of binding due to corrosion.

8.3 Metals used in a cabinet or enclosure shall be galvanically compatible.

8.4 A hinge or other attachment shall be resistant to corrosion.

8.5 A nonferrous part need not be protected against corrosion.

9 Field Wiring Connections

9.1 Field wiring terminals and leads

9.1.1 A waterflow indicator shall be provided with wiring terminals or leads for the connection of conductors of at least the size required by the National Electrical Code, NFPA 70, corresponding to the electrical rating of the indicator.

9.1.2 Duplicate terminals or leads, or equivalent means to achieve electrical supervision, shall be provided for each incoming and each outgoing conductor. A common terminal may be used for connection of both incoming and outgoing wires, provided that the design and construction of the terminal does not permit an uninsulated section of a single conductor to be looped around the terminal and serve as two separate connections, thereby precluding supervision of the connection in the event that the wire becomes dislodged from under the terminal. A notched clamping plate under a single securing screw, where separate conductors are intended to be inserted in each notch, is acceptable, but this arrangement shall be supplemented by additional marking in the wiring area or on the installation wiring diagram specifying the intended connections to the terminals.

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