



July 3, 1996

Revision pages for

Standard for

Waterflow Indicators for Fire Protective Signaling Systems

UL 346, Fourth Edition

Attached to this distribution notice is a revision of the fourth edition of UL 346.

Attached to this distribution notice is a reprinted title page for the fourth edition of UL 346.

A CHANGE ON A PAGE DATED JULY 3, 1996 IS INDICATED BY A SMALL PRINT NOTE FOLLOWING THE AFFECTED ITEM, PRECEDED AND FOLLOWED BY AN ASTERISK.

THESE NEW AND REVISED REQUIREMENTS IN THIS STANDARD ARE NOW IN EFFECT EXCEPT FOR THOSE PARAGRAPHS, SECTIONS, TABLES, FIGURES, AND OTHER ELEMENTS OF THE STANDARD HAVING FUTURE EFFECTIVE DATES AS INDICATED IN THE NOTE FOLLOWING THE AFFECTED ITEM. TO RETAIN THE REQUIREMENTS IN EFFECT UNTIL THESE FUTURE EFFECTIVE DATES, DO NOT DISCARD THE PAGES REPLACED BY THOSE HAVING FUTURE EFFECTIVE DATES UNTIL THOSE DATES.

New product submittals made prior to a specified future effective date will be judged under all of the requirements in this standard unless the applicant specifically requests that the product be judged under the current requirements. However, should the applicant elect this option, it should be noted that compliance with all the requirements in this standard will be required as a condition of continued Listing and Follow-Up Services after the effective date and understanding of this should be signified in writing.

The new (and revised) requirements are substantially in accordance with UL's Bulletin on this subject dated February 14, 1996. The bulletin is now obsolete and may be discarded.

As indicated on the title page (page 1), this UL Standard for Safety is an American National Standard. Attention is directed to the note on the title page of this Standard outlining the procedures to be followed to retain the text of this ANSI/UL Standard.

Revised and/or additional pages may be issued from time to time.

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UL 346

Standard for

**Waterflow Indicators for Fire Protective
Signaling Systems**

First Edition – July, 1975
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Fourth Edition

May 27, 1994

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Approval as An American National Standard (ANSI) covers the numbered paragraphs on pages dated May 27, 1994 and April 6, 1995. These pages should not be discarded when revised or additional pages are issued if it is desired to retain the ANSI approved text.

Approved as ANSI/UL 346-1982, August 19, 1982
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Revisions of this standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest published set of revision pages.

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- b) A ring stand with a suitable clamp is to be used for supporting the specimens.
- c) Burner and Mounting Block – The test flame is to be obtained by means of a Tirrill burner having a nominal bore of 3/8 inch (9.5 mm). The tube length above the primary air inlets is to be approximately 4 inches (102 mm). The burner is to be adjusted so that, while the burner is in a vertical position, the overall height of the flame is 5 inches (127 mm) and the height of the inner blue cone is 1-1/2 inches (38.1 mm). A mounting block is to be provided so that the burner may be positioned at an angle of 20 degrees from the vertical.
- d) A stopwatch or clock.
- e) Circulating air oven.

27.2.4 The test samples are to be conditioned for seven days in a circulating air-oven maintained at a temperature of 90°C (194°F). Prior to the flame test, the samples are to be cooled to room temperature.

27.2.5 The test samples are to be mounted as intended in service in the test chamber. The test flame is to be applied at an angle of 20 degrees from the vertical to any portion of the interior of the enclosure judged as likely to be ignited by proximity to live or arcing parts, coils, wiring, or the like.

27.2.6 The test flame is to be applied to a different location on each of the three samples tested.

27.3 Immersion test

27.3.1 Vanes made of polyethylene are to be tested to evaluate the resistance to stress-cracking when immersed in an Igepal solution.

27.3.2 Three vanes are to be immersed in stress-crack promoting medium Igepal CO-630, an alkylaryl polyethylene glycol, at 50°C (122°F) for 48 hours. After immersion, the vanes shall show no indication of cracking. The test is to be conducted in accordance with the Test Method for Environmental Stress - Cracking, ASTM D1693-70.

28 Flexing Test (Vane Assembly)

28.1 The vane assembly of a waterflow indicator shall withstand repeated flexing without cracking, breakage, or permanent set of the materials employed. For this test, a vane assembly previously subjected to the Air-Oven Aging Test (27.1.2 and 27.1.3) is to be used.

28.2 One sample vane assembly is to be flexed 1000 times between center and 60 degrees from center in both directions. After flexing, the vane assembly is to be visually examined for signs of cracking, breakage, or set, or any signs of impending malfunction.

29 Impact Test

29.1 A thermoplastic enclosure or cover of a waterflow indicator or a metal enclosure thinner than required in Table 5.2 shall withstand three 5 foot-pound (6.8 J) impacts without exposure of live parts or impairment of the operation of the indicator.

29.2 Each of two units is to be mounted securely in a position of normal use on a surface representative of a typical installation. Three 5 foot-pound (6.8 J) impacts are to be applied to each sample, each trial on a different section of the enclosure or cover, by means of a 1.18 pound (0.54 kg), 2 inch (51 mm) diameter steel sphere swung through a pendulum arc from a sufficient height to apply 5 foot-pounds (6.8 J) of energy.

29.3 Following the impacts, the unit is to be examined for damage and checked for normal operation in accordance with the Normal Operation Test, Section 16. Cracking of the enclosure or cover is acceptable if it does not impair intended operation of the product, but is not acceptable if a dust- or moisture-tight enclosure is required.

30 Tests of Elastomeric Materials

30.1 Oven aging test

30.1.1 Nonmetallic materials, other than thermoplastic or gaskets used as dust cover seals, which are employed as functional parts of a waterflow indicator, such as gaskets, "O" rings, seals, and diaphragms, shall not show signs of deterioration when subjected to visual examination and hand flexing following air oven aging for 70 hours at $100 \pm 2^{\circ}\text{C}$ ($212 \pm 3.6^{\circ}\text{F}$). This test is to be conducted in accordance with Test Method for Rubber Deterioration, ASTM D572-88. Three samples of each material are to be tested.

30.1.1 effective July 3, 1996

30.2 Hardness measurement

30.2.1 The hardness of a saddle gasket employed in a waterflow indicator is to be measured using the procedure described in Test Method for Rubber Property — Durometer Hardness, ASTM D2240-68. Three samples of the material are to be subjected to this test.

30.3 Immersion test (saddle gasket)

30.3.1 A saddle gasket employed in a waterflow indicator shall not show any signs of deterioration after being immersed in tap water at 87°C (188.6°F) for 90 days, with the gasket material in a compressed condition.

30.3.2 Three samples are to be subjected to this test. A 1 inch (25.4 mm) wide section of each gasket is to be placed between two aluminum plates measuring 3 by 4 by 3/8 inches (76.2 by 102 by 9.5 mm) and clamped in place using two bolts spaced 1-1/2 inches (38.1 mm) center-to-center until the gasket is compressed to two-thirds of its original thickness. The clamp and gasket are then to be completely immersed in tap water at a temperature of 87°C (188.6°F). After the test period, the clamp and gasket are to be removed and examined for any evidence of loosening, excessive softening or hardening, and deterioration due to cracking.

31 Immersion Test (Indicator Assembly)

31.1 A sample of the complete indicator assembly including all parts, except that the saddle gasket may be removed, is to be subjected to immersion in tap water as described below for either 90 days at 87°C (189°F) or 120 days at 70°C (158°F). The assembly is to be lowered into the bath until the water level is just below the bottom of the control box. A length of tubing is to be placed in the piping cavity and vented to the air to allow any entrapped air in the cavity to be displaced by water. Following the exposure, there shall be no cracking, warping, creeping, or other signs of deterioration of a plastic or rubber component that may prevent the intended operation of the waterflow indicator. A waterflow indicator with aged components shall then perform acceptably when subjected to the Sensitivity Test, Section 32; Surge Test, Section 34; and Hydrostatic Strength Test, Section 35. The saddle gasket, if included in this test, is to be tested as described in 30.3.1 and 30.3.2.

**Underwriters Laboratories Inc.®**

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November 16, 1995

Revision pages for

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Waterflow Indicators for Fire Protective Signaling Systems

UL 346, Fourth Edition

Attached to this transmittal notice is a revision of the Fourth edition of UL 346.

A CHANGE ON A PAGE DATED NOVEMBER 16, 1995 IS INDICATED BY A SMALL PRINT NOTE FOLLOWING THE AFFECTED ITEM, PRECEDED AND FOLLOWED BY AN ASTERISK.

THESE REVISED REQUIREMENTS BECOME EFFECTIVE JANUARY 2, 1997 AS INDICATED IN THE SMALL PRINT NOTE FOLLOWING THE AFFECTED ITEM. TO RETAIN THE REQUIREMENTS IN EFFECT UNTIL JANUARY 2, 1997, DO NOT DISCARD THE PREVIOUS PAGES CONTAINING THE REQUIREMENTS SPECIFIED ABOVE UNTIL THIS FUTURE EFFECTIVE DATE.

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The revised requirements are substantially in accordance with UL's bulletin on this subject dated August 16, 1995. The bulletin is now obsolete and may be discarded.

Attention is directed to the note on the title page of this standard outlining the procedure to be followed to retain the approved text of ANSI/UL 346-1995.

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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.

Revised 4.2.1 effective January 2, 1997

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.

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 enclosures 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.

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.

16.2.11 A successive signaling type of coded waterflow indicator shall operate without loss of signals from each indicator operated when the starting levers of two or more indicators connected to the same circuit are operated at or about the same time.

16.2.12 Successive signaling operation is considered to be the transmission of at least three fire alarm signal rounds of the first coded waterflow indicator operated, without interference or confusion of signals caused by the action of any other indicator connected to the same circuit and operated while the first indicator is operating, followed by transmission of the complete number of signal rounds from each of the other indicators operated until all of the operated indicators have completed their signals.

16.3 Noncoded waterflow indicators

16.3.1 The contacts of a noncoded waterflow indicator shall remain in the operated condition until the mechanism has been restored to its normal condition by reduction of waterflow to below its actuation setting, but not less than 4 gpm (252 cm³/s).

17 Calibration Test – Retard Feature

17.1 The calibration of a retard feature provided on a waterflow indicator shall be such that the measured time of actuation of a waterflow indicator at each setting of the retard shall be within 50 percent of the marked value but in no case shall the retard time exceed 90 seconds.

Revised 17.1 effective January 2, 1997

17.2 Samples of waterflow indicators employing a retard feature are to be tested as follows:

- a) One sample tested prior to and after subjection to the Air-Oven Aging Test (27.2.1 and 27.2.2).
- b) One sample tested prior to and after subjection to the hydrogen sulphide atmosphere described in the Corrosion Test, Section 24.
- c) One sample tested prior to and after subjection to the carbon dioxide and sulfur dioxide atmosphere described in the Corrosion Test, Section 24.
- d) One sample tested prior to and after subjection to the Endurance Test – Retard Feature, Section 18.

17.3 The retard is to be mounted in a position which is most likely to result in a malfunction or in a position recommended by the manufacturer, and adjusted in several increments in accordance with the manufacturer's instructions. The delay time of actuation is to be noted for each increment after manual actuation of the vane assembly.

18 Endurance Test – Retard Feature

18.1 A retard feature included in a waterflow indicator shall comply with the requirements of the Calibration Test – Retard Feature, Section 17, after being subjected to 500 cycles of operation with the retard set at the maximum delay setting. Each cycle is to consist of operating the indicator for alarm by actuation of the vane assembly followed by restoration to the standby condition. One sample of any pipe or tubing size is to be tested.

19 Overload and Endurance Test

19.1 The current-interrupting contacts and the operating mechanism of a waterflow indicator shall perform as intended when subjected to the overload and endurance conditions indicated in 19.2 – 19.4. There shall be no electrical or mechanical failure of the indicator assembly, nor undue burning, pitting, or welding of contacts.

Exception: The overload and endurance tests may be waived if the waterflow indicator employs a single-pole switching device having an ampere rating of not less than twice the ampere rating of the indicator.

19.2 A coded waterflow indicator is to be operated for 500 cycles by manually operating the actuating means so that the indicator mechanism produces the maximum number of signal impulses obtainable for each operation of the indicator. The test current is to be 150 percent of the rated current for 50 cycles and rated current during the following 450 cycles.

19.3 The contacts of a coded waterflow indicator that control only electromagnets employed for noninterfering signals or for successive signals are to be subjected:

- a) To 50 cycles of operation with the overload resulting from operation at 115 percent of the rated current, and
- b) To rated current for the following 450 cycles.

19.4 A noncoded waterflow indicator shall be operated manually for 500 cycles of each different set of switching contacts at the rate of 6 cycles per minute making and breaking 150 percent of the rated current and at rated voltage.

19.5 The indicator is to be tested with the load (inductive or noninductive) that the contacts are intended to control, or with the equivalent as follows:

- a) An indicator intended and marked for use on alternating current (ac) only is to be tested with ac.
- b) An indicator intended for use on direct current (dc) and an indicator not specifically marked for ac only is to be tested with dc.
- c) An indicator with a single voltage rating and a single current rating is to be tested at that voltage.
- d) An indicator with multiple voltage ratings and a single current rating is to be tested at the highest voltage.
- e) An indicator with multiple current ratings is to be tested to cover the conditions of maximum voltage, power, and current interrupted. If the indicator has different current ratings for ac and dc, the indicator is to be tested for each rating. Separate samples are to be used for testing at each different rating.

19.6 For ac signaling circuits, an equivalent inductive test load is to have a power factor of 0.6 or less.

**Underwriters Laboratories Inc.®**A not-for-profit organization dedicated to public safety
and committed to quality service**April 6, 1995****Revision pages for****Standard for****Waterflow Indicators for Fire Protective Signaling Systems****UL 346, Fourth Edition**

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THESE EDITORIAL REVISED REQUIREMENTS ARE NOW IN EFFECT.

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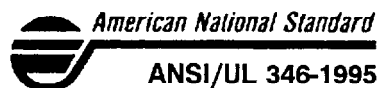
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12.10 Operating mechanisms

12.10.1 Operating parts, such as switches, relays, gears, contact assemblies, and similar devices shall be protected by individual protection or dust-tight cabinets against fouling by dust or by other material which may impair operation. The use of individual dust covers over operating mechanisms or a gasket between the enclosure and cover shall be considered as meeting this requirement.

12.10.2 An operating mechanism shall be so assembled that it is not impaired by any condition of intended operation.

12.10.3 Moving parts shall have sufficient play at bearing surfaces to prevent binding.

12.10.4 Gears and coded signaling wheels shall have smooth engaging surfaces. Cams, wheels, and similar parts shall be secured in a positive manner, other than by friction between surfaces or the use of a lock washer, to prevent independent turning or loosening.

12.10.5 Provision shall be made to prevent adjusting screws and similar adjustable parts from loosening under the conditions of actual use.

12.10.6 Manually operated parts shall have the strength to withstand the stresses to which they will be subjected in operation.

12.10.7 An electromagnetic device shall be so constructed as to provide positive electrical and mechanical performance under all conditions of intended operation.

12.10.8 A gear-train driving spring shall be securely anchored at each end. The spring-winding means shall be provided with a positive stop to limit the winding or shall withstand the maximum force likely to be applied without impairing the operation of the mechanism.

12.11 Printed wiring boards

12.11.1 Each component on the board shall be secured in a reliable manner and the spacings between circuits shall comply with the spacing requirements of this standard, see Spacings, Section 13. The board shall be mounted so that deflection of the board during servicing shall not result in damage to the board.

12.11.2 The board shall be of a fire resistant material classified as Type 94V-2 or equivalent, when tested in accordance with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.

12.12 Switches

12.12.1 A switch provided as part of a waterflow indicator shall be acceptable for the current and voltage of the circuit which it controls when the indicator is operated under any condition of intended service.

12.12.2 Mercury tube switches shall be acceptable as determined by tests described in the Performance section of this standard. Wire leads shall be as short as possible and shall terminate at eyelets or the equivalent, at terminal plates on the supporting base.

13 Spacings

13.1 For a waterflow indicator the spacings between uninsulated live parts and dead-metal parts and between uninsulated live parts of opposite polarity shall be not less than those indicated in Table 13.1.

Table 13.1
Minimum spacings

Point of application	Voltage range volts	Minimum spacings – inch ^a (mm)	
		Through air	Over surface
To Walls of Enclosure ^b			
Cast Metal Enclosures	0 – 300	1/4 (6.4)	1/4 (6.4)
Sheet Metal Enclosures	0 – 300	1/2 (12.7)	1/2 (12.7)
Installation Wiring Terminals			
With Barriers	0 – 30	1/8 (3.2)	3/16 (4.8)
	31 – 150	1/8 (3.2)	1/4 (6.4)
	151 – 300	1/4 (6.4)	3/8 (9.5)
Without Barriers	0 – 30	3/16 (4.8)	3/16 (4.8)
	31 – 150	1/4 (6.4)	1/4 (6.4)
	151 – 300	1/4 (6.4)	3/8 (9.5)
Rigidly Clamped Assemblies ^c			
100 volt-amperes or less	0 – 30	1/32 ^d (0.8)	1/32 ^d (0.8)
Over 100 volt-amperes	0 – 30	3/64 (1.2)	3/64 (1.2)
	31 – 150	1/16 (1.6)	1/16 (1.6)
	151 – 300	3/32 (2.4)	3/32 (2.4)
Other Parts	0 – 30	1/16 (1.6)	1/8 (3.2)
	31 – 150	1/8 (3.2)	1/4 (6.4)
	151 – 300	1/4 (6.4)	3/8 (9.5)
^a Measurements are to be made with solid wire of adequate ampacity for the applied load connected to each terminal. In no case is the wire to be smaller than No. 18 AWG (0.82 mm ²). ^b The spacings for "To Walls of Enclosure" apply between an uninsulated live part and (1) a wall or cover of a metal enclosure, (2) a fitting for conduit or metal-clad cable, and (3) a metal piece attached to a metal enclosure, where deformation of the enclosure is likely to reduce spacings. They are not to be applied to an individual enclosure of a component part within an outer enclosure. ^c Rigidly clamped assemblies include such parts as contact springs on relays or cam switches, printed wiring boards, and the like. ^d Spacings less than those indicated, but in no case less than 1/64 inch (0.4 mm) are acceptable for the connection of integrated circuits and similar components where the spacing between the adjacent connecting wires on the component is less than 1/32 inch (0.8 mm).			

13.2 The spacings within snap switches, lampholders, holders, and similar wiring devices supplied as part of a unit are judged on the basis of the requirements for such devices.

13.2 revised April 6, 1995

37.2 If the unit employs both high-voltage and low-voltage circuits, the test is to be conducted with the low-voltage circuits connected to the cabinet, chassis, or other dead-metal parts so that the potential that is applied between the high-voltage live parts and dead-metal parts will simultaneously be applied between the high-voltage live parts and low-voltage circuits.

37.3 A printed wiring assembly or other electronic circuit component that would be damaged by the application of, or would short-circuit, the test potential, is to be removed, disconnected, or otherwise rendered inoperative before the test. A representative subassembly may be tested instead of an entire unit. Rectifier diodes in the power supply may be individually shunted before the test to reduce the likelihood of destroying them in the case of a malfunction elsewhere in the secondary circuits.

37.4 A 500 VA or larger transformer, the output voltage of which can be varied, is to be used to determine compliance with 37.1. The requirement of a 500 VA or larger transformer can be waived if the high potential testing equipment used is such that it maintains the specified voltage at the unit during the test.

37.5 The test equipment is to include a visible indication of application of the test potential and an audible or visible indication, or both, of breakdown. In the event of breakdown, manual reset of an external switch is required, or an automatic reject of the unit under test is to result. Other arrangements may be considered and accepted if found to achieve the results contemplated.

37.6 If the charging current through a capacitor or capacitor type filter connected across line, or from line to earth ground, is sufficient to prevent maintenance of the specified ac test potential, the unit is to be tested using a dc test potential in accordance with 37.1.

MARKING

38 General

38.1 Additional marking requirements are specified in 4.3.1, 4.4.1, 12.1.1, and 12.1.4.

38.1 revised April 6, 1995

38.2 A waterflow indicator shall be plainly and permanently marked with the following information unless specifically indicated that the marking may appear on an installation wiring diagram.

- a) Name or identifying symbol of the manufacturer or private labeler.
- b) Model number or equivalent, and serial number or date code.
- c) Maximum system working pressure in pounds per square inch.
- d) Electrical rating in volts, amperes, and frequency for each circuit. (May appear on an installation diagram.)
- e) Indication of direction of waterflow. The indication shall be either raised or depressed at least 1/32 inch (1.6 mm) so as not to be easily obliterated by painting in service.
- f) Correct mounting position, if a waterflow indicator is intended to be mounted in a definite position. (May appear on installation diagram.)

g) Reference to an installation diagram; if the diagram is separate from the indicator, by drawing number and issue number or date.

h) The minimum flow rate, or ranged flow rates, required for alarm operation; for example, "Minimum Flow Rate for Alarm – 4 to 10 GPM." The marked rate or range shall be within the operational limits specified in Sensitivity Test, Section 32.

38.3 Information required to be marked directly on the waterflow indicator shall be readily visible after installation. The removal or opening of an enclosure cover or the removal of not more than two screws, or an equivalent arrangement to view the marking, is considered to comply with this requirement.

38.4 If a manufacturer produces units at more than one factory, each such unit shall have a distinctive marking to identify it as the product of a particular factory.

39 Instructions and Installation Drawings

39.1 An installation diagram(s) shall be provided with each waterflow indicator showing the electrical field connections to be made and the method of installation in the sprinkler riser. The diagram(s) shall be attached to the indicator or, if separate, shall be referenced in the marking attached to the indicator with the diagram number and issue number or date, or both.

39.2 The diagram shall show a pictorial view or equivalent of the installation terminals or leads to which field connections are made as they would appear when viewed from the front. The terminal designations on the indicator shall agree with the designations on the diagram. An unattached diagram shall be marked with the name or trademark of the manufacturer, drawing number, and issue number or date, or both.

39.3 The installation diagrams shall include the following additional information:

a) Instructions on the installation of the device in the sprinkler pipe, such as hole sizes and locations, orientation of the device, direction of waterflow past the indicator, and any special techniques, such as rolling of the vane.

b) Recommended torque values for the mounting bolts.

c) Instructions on setting retard features.

d) If the device is intended for installation in more than one schedule of pipe sizes, instructions on trimming the vane or any other necessary adjustments.

Waterflow Indicators for Fire Protective Signaling Systems

