



UL 1626

STANDARD FOR SAFETY

Residential Sprinklers for Fire-Protection Service

*UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM*



Documents
Document Sharing Hub

UL Standard for Safety for Residential Sprinklers for Fire-Protection Service, UL 1626

Fourth Edition, Dated March 14, 2008

Summary of Topics

These revisions to ANSI/UL 1626 are being issued to include changes in the following requirements:

Polymeric Sprinklers

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 November 18, 2011 and March 9, 2012.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical photocopying, recording, or otherwise without prior permission of UL.

UL provides this Standard "as is" without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability or fitness for any purpose.

In no event will UL be liable for any special, incidental, consequential, indirect or similar damages, including loss of profits, lost savings, loss of data, or any other damages arising out of the use of or the inability to use this Standard, even if UL or an authorized UL representative has been advised of the possibility of such damage. In no event shall UL's liability for any damage ever exceed the price paid for this Standard, regardless of the form of the claim.

Users of the electronic versions of UL's Standards for Safety agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgment (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing an electronic Standard on the purchaser's computer system.

The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

No Text on This Page

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**



Documents

Document Sharing Hub

MARCH 14, 2008
(Title Page Reprinted: April 12, 2012)



ANSI/UL 1626-2012

1

UL 1626

Standard for Residential Sprinklers for Fire-Protection Service

First Edition – April, 1988
Second Edition – September, 1994
Third Edition – July, 2001

Fourth Edition

March 14, 2008

This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through April 12, 2012.

The most recent designation of ANSI/UL 1626 as an American National Standard (ANSI) occurred on April 11, 2012. The ANSI approval for this standard does not include the Cover Page, Transmittal Pages, Title Page or effective date information.

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 <http://csds.ul.com>.

UL's Standards for Safety are copyrighted by UL. Neither a printed nor electronic copy of a Standard should be altered in any way. All of UL's Standards and all copyrights, ownerships, and rights regarding those Standards shall remain the sole and exclusive property of UL.

COPYRIGHT © 2012 UNDERWRITERS LABORATORIES INC.

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM**



Documents
Document Sharing Hub

No Text on This Page

*UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL*



Documents

Document Sharing Hub

CONTENTS

INTRODUCTION

1 Scope	6
2 Components	6
3 Units of Measurement	7
4 Undated References	7
5 Glossary	7
5.1 General	7
5.2 Residential sprinkler types	8

CONSTRUCTION

6 General	8
7 Inlet Threads	9
8 Temperature Ratings	9
9 Pressure Rating	10
10 Nominal "K" Factors	10
11 Protective Covers	10
11A Polymeric Sprinklers	10

PERFORMANCE

GENERAL

12 Details	10A
13 Samples	11

PHYSICAL STRENGTH AND LEAKAGE TESTS

14 Load on Heat Responsive Element Test	11
15 Strength of Heat Responsive Element Test	11
15.1 Fusible-alloy types	11
15.2 Glass-bulb types	12
16 Glass-bulb thermal shock test	12
17 Strength of Frame Test	12
18 Impact Resistance Test	13
19 Impact Test for Protective Covers	15
20 Rough Usage Test	17
21 Flow Endurance Test	17
22 Leakage Test	18
23 Hydrostatic Strength Test	18
24 Dry Sprinkler Air Tightness Test	18
25 30-Day Leakage Test	20
26 Water Hammer Test	21
27 Vacuum Test	22

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents
Document Sharing Hub

OPERATION TESTS

28 Operating Temperature (Bath) Test	22
29 Sensitivity Tests	23
29.1 Oven heat test	23
29.2 Room heat test	26
30 Operation – Lodgement Test	30

EXPOSURE AND CORROSION TESTS

31 High Temperature Test	32
32 Elastomeric Parts Test	33
33 Vibration Test	33
34 Freezing Test	34
35 Corrosion Exposure Tests	34
35.1 General	34
35.2 5 percent salt spray	35
35.3 Moist hydrogen sulfide air mixture	35
35.4 Moist carbon dioxide-sulfur dioxide air mixture	35
36 Moist Air Test	35
37 Exposure Tests On Sprinklers Incorporating Polymeric Gaskets	36
37.1 General	36
37.2 Corrosive exposures	36
37.3 Temperature cycling exposure	36
37.4 Hydrocarbon exposure followed by moist air exposure	36
37.5 Hydrocarbon exposure followed by water immersion exposure	37
37.6 Exposure to antifreeze solutions	37
38 Dry-Type Sprinkler Deposit Loading Test	37
39 Dezincification Test of Brass Parts	38
39.1 General	38
39.2 Reagent	39
39.3 Test Pieces	39
39.4 Method	39
40 Stress-Corrosion Cracking of Brass Sprinkler Parts Test	40
41 Stress-Corrosion Cracking of Stainless Steel Sprinkler Parts Test	40

WATER FLOW AND DISTRIBUTION TESTS

42 Calibration Test	41
43 Water Distribution Test – Horizontal Surface	44
43.1 Acceptance criteria	44
43.2 Test method	44
44 Water Distribution Test – Vertical Surface	48
44.1 Acceptance criteria	48
44.2 Test method	48

FIRE TESTS

45 Water Impingement Test	51
46 Fire Test	51
46.1 General	51
46.2 Test arrangement	56
46.3 Test method	60

UL COPYRIGHTED MATERIAL –
 NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
 DISTRIBUTION WITHOUT PERMISSION FROM  **Documents**
 Document Sharing Hub

46.4 Supplementary test	.60A
-------------------------------	------

TESTS UNIQUE TO POLYMERIC SPRINKLERS

46A Polymeric Sprinkler Exposure Tests	.60A
46A.1 General	.60A
46A.2 Test samples and post exposure testing	.60A
46A.3 Water immersion exposure	.60B
46A.4 Air oven aging exposure	.60B
46A.5 Light and water exposure	.60C
46B Long-Term Hydrostatic Pressure Test for Polymeric Sprinklers	.60C
46C Temperature Cycling Exposure for Polymeric Sprinklers	.60D
46D Impact Test for Polymeric Sprinklers	.60D

MANUFACTURING AND PRODUCTION TESTS

47 General	.61
48 Production Leakage Test	.61
49 Glass Bulb Integrity Test	.61

MARKING

50 General	.62
------------------	-----

INSTALLATION INSTRUCTIONS

51 Design Parameters and Installation Instructions	.63
--	-----

APPENDIX A

INTRODUCTION

1 Scope

1.1 These requirements cover residential sprinklers intended for installation on sprinkler systems for fire-protection service. Requirements for the installation and use of residential sprinklers are included in the Standards for the Installation of Sprinkler Systems, NFPA 13, and Installation of Sprinkler Systems in One- and Two-Family Dwellings and Mobile Homes, NFPA 13D, and Residential Occupancies up to and Including Four Stories in Height Sprinkler Systems, NFPA 13R.

1.2 The requirements in this standard are not intended to restrict the application of representative fire and other tests for special sprinklers, as referenced in Standard for the Installation of Sprinkler Systems, NFPA 13, that are intended to provide protection for specific fire hazards.

1.3 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

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 General

5.1.1 For the purpose of this standard the following definitions apply.

5.1.2 DISCHARGE COEFFICIENT "K" – Coefficient of discharge in the formula,

$$Q = K\sqrt{p}$$

where:

Q is the flow in gallons per minute (L/s x 15.85), and p is the pressure in psig (MPa x 145).

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

5.1.4 HEPTANE – Commercial grade heptane having the following characteristics:

- a) Minimum Initial Boiling Point of 190°F (88°C);
- b) Maximum Dry Point of 212°F (100°C); and
- c) Specific Gravity (60°F/60°F) (15.6°C/15.6°C) of 0.68 – 0.73.

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

5.1.6 ORIFICE – The opening that controls the amount of water discharged from a sprinkler at a given pressure.

5.1.7 RESIDENTIAL SPRINKLER – A sprinkler intended to be installed in residential occupancies and that opens automatically by operation of a heat-responsive releasing mechanism that maintains the discharge orifice closed. Upon operating at a specified temperature, a discharge of water is distributed in a specific pattern and quantity over a designated area.

5.2 Residential sprinkler types

5.2.1 FLUSH CEILING SPRINKLER – A sprinkler in which all or part of the body, including the shank thread, is mounted above the lower plane of the ceiling.

5.2.2 COATED, PAINTED, OR PLATED SPRINKLER – A sprinkler that has factory applied coatings, paint, or platings for corrosion protection or decorative purposes.

5.2.3 CONCEALED CEILING SPRINKLER – A sprinkler assembly having a cover plate.

5.2.4 DRY-TYPE SPRINKLER – A sprinkler secured in an extension nipple that has a seal at the inlet end to prevent water from entering the nipple until the sprinkler operates. These sprinklers may consist of a pendent, sidewall, ceiling or other types.

5.2.5 PENDENT SPRINKLER – A sprinkler intended to be installed so that its deflector is located below the orifice and the water flows downward through the orifice.

5.2.6 RECESSED SPRINKLER – A sprinkler assembly in which all or part of the sprinkler body or frame, other than the shank thread, is mounted within a recessed housing.

5.2.7 SIDEWALL SPRINKLER – A sprinkler intended for installation on or near the wall and near the ceiling, and designed to discharge most of the water away from the nearby wall with a small portion of the discharge directed at the wall behind the sprinkler.

5.2.8 UPRIGHT SPRINKLER – A sprinkler intended to be installed so that its deflector is located above the orifice and the water flows upward through the orifice.

CONSTRUCTION

6 General

6.1 A residential sprinkler 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).

6.2 For dry-type pendent and sidewall residential sprinklers, the connection of the extension nipple to the seal assembly at the inlet shall be airtight. See Dry Sprinkler Air Tightness Test, Section 24.

6.3 A sprinkler shall be chemically or mechanically staked to maintain the manufacturer's assembly load. The assembly load shall be incapable of being changed by the use of common hand tools without causing visible damage to the sprinkler.

6.4 Stampings shall show no cracking or splitting and shall be uniformly smooth and clean cut.

6.5 The operation and distribution characteristics of a sprinkler shall not be impaired by the application of any factory applied coating or plating.

6.6 When installed with the intended fittings specified in the installation instructions, see Design Parameters and Installation Instructions, Section 51, dry-type sprinklers installed in dry systems shall be constructed to minimize the potential to accumulate water, scale, and sediment on the sprinkler inlet and shall provide an unobstructed flow path upon operation.

7 Inlet Threads

7.1 Inlet pipe threads, if provided, shall comply with the Standard for Pipe Threads, General Purpose (Inch), ANSI/ASME B1.20.1.

Exception No. 1: Dry-type sprinklers shall be provided with 3/4- or 1-inch external NPT pipe threads.

Exception No. 2: Sprinklers intended for use in installations where sprinkler fittings incorporate pipe threads other than NPT-type may be provided with threads complying with a national pipe thread standard compatible with those fittings.

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

8 Temperature Ratings

8.1 The temperature classifications, temperature ratings, and color codings of a residential sprinkler shall be as specified in Table 8.1. See 50.8.

Table 8.1
Temperature classification ratings and color coding

Temperature classification	Temperature rating		Color code		Maximum ceiling 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 (68°C) or Green 200, 225°F (93, 107°C)	150	(66)

9 Pressure Rating

9.1 A residential sprinkler shall have a minimum rated pressure of 175 psig (1.2 Mpa), 250 PSIG (1.7 Mpa), or 300 psig (2.1 Mpa).

10 Nominal "K" Factors

10.1 Sprinkler orifices shall have individual "K" factor values that are within ± 5 percent of the average "K" factor determined at a specific pressure for the dimensional tolerance specified by the manufacturer.

Exception: A sprinkler with an average "K" factor of less than 5.5 is able to have individual "K" factor values that are not within ± 5 percent of the average "K" factor if the single "K" factor value is within ± 0.2 units of the average "K" factor value.

10.2 The diameter of a discharge orifice or any internal passage of a sprinkler shall be at least 0.21 inch (5.3 mm).

11 Protective Covers

11.1 Sprinklers with glass bulb type heat responsive elements shall be equipped with protective covers that are designed to remain in place during installation and be removed before the sprinkler system is placed in service.

Exception: Certain sprinkler designs, such as concealed sprinklers, dry-type sprinklers, and sprinklers with guards, may not be required to have protective covers.

11.2 Sprinklers required to be equipped with sprinkler covers shall comply with Section 19, Impact Test for Protective Covers, and 50.12.

11A Polymeric Sprinklers

11A.1 Sprinklers having pressure retaining and other load bearing components made of polymeric materials shall be constructed to comply with the following:

- a) Construction requirements described in Sections 6 – 11A, Manufacturing and Production performance requirements described in Sections 47 – 49, Marking requirements described in Section 50, and Installation Instruction requirements described in Section 51.
- b) Performance requirements described in Sections 12 – 46A, except Section 37.
- c) Sprinklers that have polymeric gaskets and no additional pressure retaining or load bearing polymeric components shall comply with the requirements described in Sections 12 – 46 and are not limited to the use restrictions described in 11A.2 and 11A.3.

11A.1 added April 12, 2012

11A.2 Polymeric materials used to construct pressure retaining and load bearing components shall be constructed in such a manner that the polymeric materials do not extend into the area being protected by the sprinkler unless covered with a metallic material such as brass, bronze or stainless steel.

11A.2 added April 12, 2012

11A.3 The manufacturer's installation instructions shall indicate that the polymeric sprinklers are to be installed in NFPA 13D applications and attached to sprinkler systems constructed of plastic sprinkler pipe and fittings only. See Section 51.

11A.3 added April 12, 2012

PERFORMANCE

GENERAL

12 Details

12.1 To determine compliance with these requirements, the various types of a sprinkler shall be subjected to the performance tests described in Sections 12 – 46.

12.2 When a recessed or concealed sprinkler is tested with an escutcheon during the performance tests, the sprinkler is to be recessed to the maximum depth allowed by the sprinkler/escutcheon combination.

No Text on This Page

*UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL*



Documents

Document Sharing Hub

13 Samples

13.1 The number of samples required for investigation may vary for different sprinkler types. The number of samples required for examination and test are to be determined following a review of detailed drawings, examination of a preliminary sample, or both.

PHYSICAL STRENGTH AND LEAKAGE TESTS

14 Load on Heat Responsive Element Test

14.1 The average and maximum design loads exerted on the heat responsive element, and the overall load tolerance based on the design load for the assembly, are to be determined. When the application of the rated working pressure to the inlet end of the sprinkler increases the assembly load by more than 10 percent, the additional load is to be added to the measured load on the heat responsive element. The information developed is to be used for Strength of Heat Responsive Element Test, Section 15.

14.2 At least 25 sprinklers are to be tested to determine the average load. An arrangement for measuring the load on the heat responsive element is to be developed for each specific design.

15 Strength of Heat Responsive Element Test

15.1 Fusible-alloy types

15.1.1 A fusible-alloy heat responsive element of a residential sprinkler shall either:

- a) Sustain a load of 15 times its maximum design load for 100 hours, or
- b) Demonstrate the ability to sustain the maximum design load when tested in accordance with 15.1.2 and 15.1.3.

15.1.2 Compliance with 15.1.1(b) is to be determined by subjecting sample heat-responsive elements to loads in excess of the maximum design load. A minimum of ten samples are to be loaded at various values as required up to 15 times the design load. At least one heat responsive element shall sustain a load for a time greater than 1000 hours. These load and time values shall then be used to derive a least-square, full logarithmic regression curve of load as a function of time, from which the loads at 1 hour and 1000 hours are to be determined. The design load shall comply with the following:

$$L_d \leq 1.02L_m^2/L_o$$

in which:

L_d is the maximum design load,

L_m is the load at 1000 hours, and

L_o is the load at 1 hour.

15.1.3 The load tests are to be conducted at an ambient temperature of $70 \pm 5^{\circ}\text{F}$ ($21 \pm 3^{\circ}\text{C}$).

15.2 Glass-bulb types

15.2.1 The lower tolerance limit for bulb strength, based on calculations with a degree of confidence of 0.99 for 99 percent of samples, shall exceed two times the upper tolerance limit for sprinkler assembly load based on calculations with the same degree of precision as for bulb strength. Calculations are to be based on the Normal or Gaussian Distribution except where another distribution can be shown to be more applicable due to manufacturing or design factors. The bulb strength is to be measured by applying a steadily increasing load, utilizing a compression testing machine, until the bulb breaks. This test is to be conducted with the bulb mounted in the seating parts, with the same dimensions used in the sprinkler and a material hardness within the range of 38 – 50 Rockwell C. The rate of loading shall not exceed 55 pounds-force load per second (25 kg/s), or at a rate of loading that deflects the bulb 0.02 inch (0.51 mm) per minute, whichever measurement is convenient for the test apparatus being used. Bulb seatings may be reinforced circumferentially so as not to interfere with the bulb breakage. A minimum of 15 samples of each temperature rating and each bulb type are to be tested. See Appendix A.

16 Glass-bulb thermal shock test

16.1 A sprinkler having a glass bulb shall withstand the thermal shock of rapid temperature changes when tested as specified in 16.2 without breakage or fracture of the glass bulb.

16.2 At least five samples of the sprinkler are to be conditioned for 5 minutes in a liquid bath at 20°F (11°C) less than the marked temperature rating. The samples then are to be removed and immediately submerged in another liquid bath at 50°F (10°C). The bulb of each sprinkler shall be visually observed for signs of breakage or fracture.

17 Strength of Frame Test

17.1 A residential sprinkler frame shall not show permanent distortion in excess of 0.2 percent of the distance between its bearing points when subjected to a test loading of twice its assembly load at rated hydrostatic pressure.

17.2 The distance between load-bearing points is to be measured to the nearest 0.001 inch (0.03 mm) from the plane of the sprinkler-orifice outlet at the center of the orifice to the center of the compression bearing surface.

17.3 At least ten samples are to be individually installed in a test apparatus that applies a load to the upper compression bearing surface. A measuring instrument is to be attached to indicate the amount of deflection at the deflector end of the sprinkler frame.

17.4 The heat responsive element of the sample is to be carefully removed so as not to damage the frame. The negative axial deflection, due to release of the assembly load, is to be recorded. A load is then to be applied to redeflect the sprinkler at a rate of 0.02 inch (0.51 mm) per minute until the deflection returns to zero. The load at zero deflection is to be recorded as the assembly load. An alternate means of determining assembly load shall be permitted to be utilized when determined to provide equivalent or more accurate results.

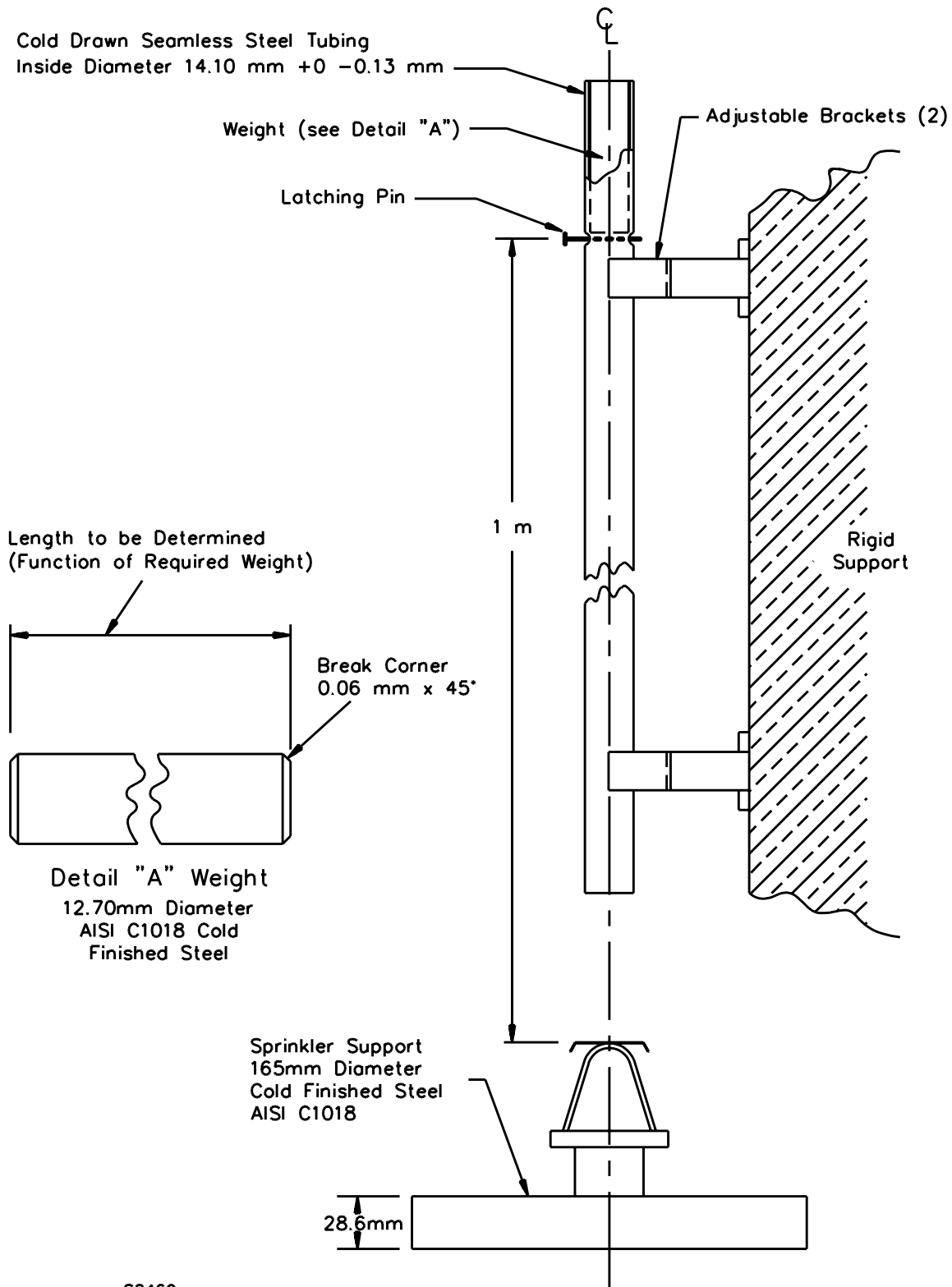
17.5 A load of twice the assembly load at rated pressure is then to be applied to the individual sample. The deflection during the load application and the amount of permanent set after the load application are to be determined to verify compliance with the requirements in 17.1.

18 Impact Resistance Test

18.1 A residential sprinkler, except for dry-type sprinklers, shall not be damaged or leak when tested as described in 18.2. See Figure 18.1.

18.2 Five sample 5.6 nominal "K" factor standard sprinklers are to be tested by dropping a cylindrical mass equivalent to the mass of the sprinkler to the nearest 15-g increment from a height of one meter onto the geometric center of the deflector or, when this is not practicable, onto the butt end of the sprinkler. The mass is to be prevented from impacting more than once upon each sample. Following the impact, each sprinkler is to be visually examined and there shall be no evidence of cracks, breaks, or any other damage. Each sample sprinkler shall then withstand a 435 psig (3 MPa) hydrostatic pressure for 1 minute without leakage. In addition, each sample shall then be subjected to the Oven Heat Test, see 29.1.

Figure 18.1
Impact test apparatus



S2469

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM **AVA** Documents
Document Sharing Hub

19 Impact Test for Protective Covers

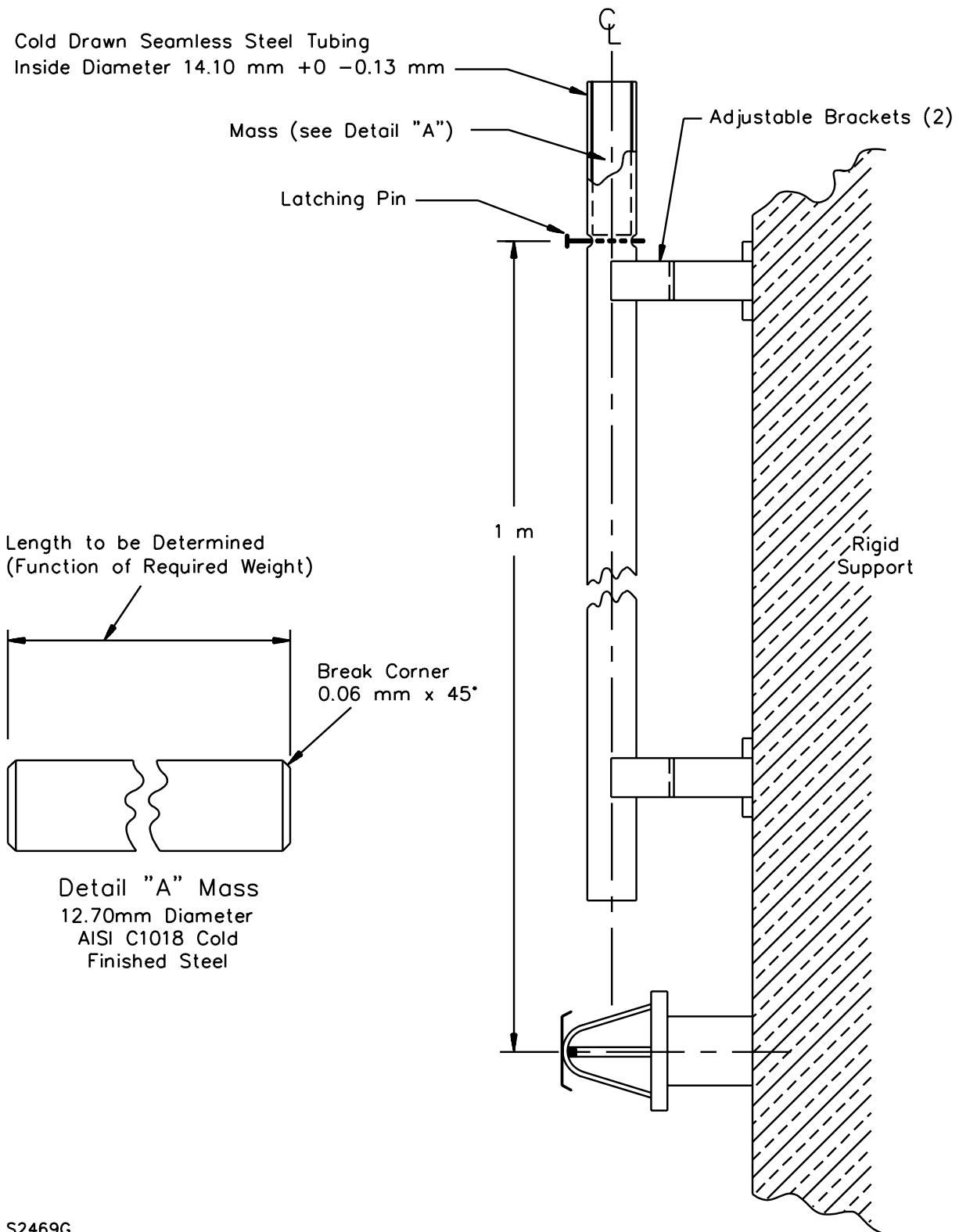
19.1 A glass bulb type sprinkler, with the protective cover installed, shall not be damaged or leak, and the cover shall remain in place, when tested as described in 19.2. See Figure 19.1.

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**



Documents
Document Sharing Hub

Figure 19.1
Impact test apparatus for protective covers



S2469G

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM **AVA** Documents
Document Sharing Hub

19.2 Five sample glass bulb sprinklers with their protective covers are to be mounted in the horizontal position and impacted with a cylindrical mass equivalent to the mass of the sprinkler to the nearest 15-gram increment from a height of one meter onto the geometric center of the glass bulb heat responsive element. Five additional samples are to be tested with the impact applied to the opposite side of the sprinkler if the cover is designed to provide unsymmetrical protection. If the glass bulb extends beyond the perimeter of the sprinkler deflector, an additional five sample sprinklers are to be mounted in the vertical position and impacted with the same cylindrical mass from a height of one meter onto the geometric center of the glass bulb heat responsive element. The mass is to be prevented from impacting more than once upon each sample. Following the impact, each sprinkler is to be visually examined and there shall be no evidence of cracks, breaks, or any other damage to the glass bulb. Each sample sprinkler shall then be subjected to the Leakage Test in Section 22. In addition, each sample shall then be subjected to the Oven Heat Test in 29.1.

20 Rough Usage Test

20.1 A residential sprinkler, except for dry-type sprinklers, shall withstand the effects of rough usage as described in 20.3 without deterioration of its performance characteristics. Following the exposure described in 20.3, the sprinkler shall comply with the Leakage Test, Section 22, and the Sensitivity Tests, Section 29 following the rough usage exposure.

20.2 Five sample sprinklers are to be tested. The sprinklers may be tested with a shipping protector in place if the protector is intended to be removed from the sprinkler after the sprinkler is installed and reference to this removal requirement is made in the installation instructions.

20.3 Five samples are to be individually placed in a vinyl-lined right hexagonal prism-shaped drum^a designed to provide a tumbling action. The drum is to have an axis of rotation of 10 inches (254 mm). The distance between opposite sides is to be 12 inches (305 mm). For each test, one sample and five 1-1/2-inch (38.1-mm) hardwood cubes are to be placed in the drum. The drum is to be rotated at 1 revolution per second for 3 minutes. The sample is to be removed from the drum, examined for signs of damage, and then subjected to the Leakage Test, Section 22, and to the Sensitivity Tests, Section 29.

^a A drum acceptable for this test is available from Kramer Industries, Inc., Copiague, NY 11726, Model K1401.

21 Flow Endurance Test

21.1 A residential sprinkler shall withstand for 30 minutes, without evidence of cracking, deformation, or separation of any part, a waterflow at a pressure equal to the rated pressure plus 25 psig (172 kPa).

21.2 One sample of a residential sprinkler is to be installed on an elbow or tee in a pressurized water system. The heat responsive element of the sample is to be activated, and the sample subjected to waterflow at the pressure specified in 21.1 for 30 minutes.

22 Leakage Test

22.1 A residential sprinkler shall not exhibit any leakage at any pressure from 0 to the applicable leakage test pressure shown in Table 22.1 when tested as described in 22.2 and 22.3.

Table 22.1
Test pressures for the leakage and hydrostatic tests

Rated pressure		Leakage test pressure		Hydrostatic test pressure	
psig	(MPa)	psig	(MPa)	psig	(MPa)
175	(1.2)	500	(3.4)	700	(4.8)
250	(1.7)	500	(3.4)	1000	(6.9)
300	(2.1)	600	(4.1)	1200	(8.3)

22.2 At least 20 samples are to be individually tested. The samples are to be filled with water and vented of air.

22.3 The pressure is to be increased from 0 to 500 psig (0 to 3.45 MPa) at a rate not exceeding 300 psig (2.07 MPa) per minute and held for 1 minute. There shall be no visible leakage in any sample.

23 Hydrostatic Strength Test

23.1 A residential sprinkler shall withstand, for 1 minute, without rupture, an internal hydrostatic pressure equal to the hydrostatic test pressure shown in Table 22.1.

23.2 The samples from the Leakage Test, Section 22, are to be used for this test.

23.3 The sprinkler inlets are to be filled with water and vented of air. The pressure is to be increased from 0 to 700 psig (0 to 4.8 MPa) at a rate not exceeding 300 psig (2.07 MPa) per minute. The pressure is to be maintained at the specified test pressure and held for 1 minute. The sample shall not rupture, operate, or release any of its operating parts during the pressure increase nor while being maintained at the test pressure for 1 minute.

24 Dry Sprinkler Air Tightness Test

24.1 When tested as described in 24.2 and 24.3, the connection of the extension nipple to the inlet seal assembly for a dry-type pendent or sidewall sprinkler shall not exhibit leakage at any air pressure from 0 to 15 psig (0 to 103 kPa) when the pressure is applied externally to this connection.

24.2 At least five samples are to be individually tested. The assembly is to be installed in an air leakage test fixture in such a manner that the extension nipple connection to the inlet seal assembly can be fully pressurized with air. See Figure 24.1.