



WA CL# FIRESI*988RJ

FIRE SPRINKLER EQUIPMENT SUBMITTAL

FOR

MARKET READY
Marymoor Technology Center
18300 Redmond Way
Redmond, WA 98052

FSI Job #3492

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1. Flexible Drop Nipple - Flexhead

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1. Reliable - QR Recessed Pendent & Upright - F1FR

SECTION 1

PIPE & FITTINGS

FlexHead commercial fire sprinkler connections

1 9 8 7
25+
YEARS OF
EXCELLENCE
2 0 1 2



Submittal Package

FLEXHEAD[®]

INDUSTRIES 

The pioneers in flexible fire protection

www.flexhead.com



N.Y.C. MEA #261-99-E
CA: OPA-0672

The FlexHead Advantage

FlexHead QUALITY

- **Best corrosion resistance**
Made from 100% 304 stainless steel
- **Excellent friction loss values**
One-inch true-bore ID reducing the need to upsize mains and branch lines
- **Pressure surge protection**
Fully braided connection improves pressure capability and prevents hose damage
- **Highest maximum working pressure**
Rated up to 300 psig
- **No o-rings or gaskets**
Welded connections reduce potential leak points at the inlet and outlet fitting
- **Tightest thread tolerances**
Outlet fitting threads are machined from solid bar stock reducing potential leaks at the sprinkler head fit-up
- **Extra stability**
Bracket has a full 6 inch base to stabilize the sprinkler head during installation, pressurization or activation

FlexHead FEATURES

- Is **seismically qualified** for use, eliminating the need for an oversized ring around the sprinkler head in seismic areas
- Has the same product design that is **dual listed** by both UL and FM
- Can be **produced domestically** to meet all your project requirements
- Has **serial identification** with complete audit tracking of finished goods
- Has a **comprehensive limited warranty** backed by an A++ insurance company



U.S. and international patents pending: #6,123,154, #6,119,784, #6,752,218, #7,032,680, #6,488,097.

The FlexHead name and logo are trademarks of FlexHead Industries.

FGG/BM/CZ™ System Compatible indicates that this product has been tested, and is monitored on an ongoing basis, to assure its chemical compatibility with FlowGuard Gold®, BlazeMaster® and Corzan® pipe and fittings. FGG/BM/CZ™, FlowGuard Gold®, BlazeMaster®, and Corzan® are licensed trademarks of The Lubrizol Corporation

USGBC and LEED are registered trademarks of the U.S. Green Building Council.

FLEXHEAD[®]
INDUSTRIES

The pioneers in flexible fire protection

800-829-6975 www.flexhead.com

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Whether your application is commercial, industrial, clean room, or institutional, FlexHead flexible sprinkler systems can save you time and money by offering reliable, highly efficient, seismically qualified, and environmentally responsible products.

Installation Instructions

Tools Required

Standard pipe wrench
Safety glasses
Adjustable wrench
Screwdriver

Materials Required

Sprinkler pipe thread sealant
Teflon® tape

1. Mounting Bracket Assembly M#: MP-24-BKT-2

Remove one (1) 3/8" bolt and one (1) 1/4" bolt from hardware bag in box. Remove (1) universal hub and one (1) mounting bracket from box. Thread the 3/8" bolt through side of universal hub. Select one (1) of the four (4) sprinkler port locations on mounting bracket.

- A. Insert tab of universal hub into slot on mounting bracket as shown. (Photo 1a)
- B. Flip bracket over and insert and tighten 1/4" attachment bolt thru pre-punched hole in bracket until tight as shown. (Photo 1b)



- B. Thread the 3/8" bolt through side of universal hub.



2. Attach Mounting Bracket to T-bar Suspended Ceiling Grid

Note: These products are designed for use with Intermediate or Heavy Duty ceiling grids manufactured to ASTM C 635 (*Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings*) and ASTM C 636 (*Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels*) Designation.

- A. From above the ceiling, position FlexHead Mounting Bracket ends on to T-bar grid so that the center hole in support bracket aligns directly above the sprinkler hole prepared in ceiling tile. Be sure the center section of the bracket end is on the outside of grid and base section is on the inside. Position the ends of the support bracket on the T-bar grid and push each of the two (2) ends of the bracket down to snap in place as shown. (Photo 2)

3. Anchor Bracket to T-bar Grid

- A. Anchor bracket to t-bar grid with self tapping screw through bottom hole in bracket end into grid. Be sure to install self tapping screw in lower hole of bracket end with attachment clip as shown. Repeat process on opposite end of bracket. Both ends of bracket should be anchored as shown. (Photo 3)



4. Connect FlexHead to Sprinkler Branch-line

Apply teflon tape and pipe sealant to one inch (1") threaded end of FlexHead Sprinkler Drop per NFPA guidelines. Attach one inch (1") threaded end of FlexHead Sprinkler Drop to branch-line per NFPA, State and local code guidelines.

The flexible hose with fitting is only intended to be installed with bends.

Do not use welded or braided hose section of FlexHead Sprinkler Drop for a wrenching surface. **Attach FlexHead Sprinkler Drop using rigid pipe end of units as wrenching surface as shown.** (Photo 4)



5. Secure FlexHead Sprinkler Drop to Mounting Bracket and Install Sprinkler Head

- A. Bend the Flexhead to hold its desired position. **Do not overbend the flexible hose. FlexHead has a 3" (75mm) minimum bend radius per UL guidelines and 8" per FM guidelines.** Insert reducing coupling end of FlexHead Sprinkler Drop through center hole in previously installed support bracket and hole in ceiling tile. Make sure the hose is bent sufficiently so that the reducing coupling sits perfectly vertical in center hole of support bracket. Do not torque or twist FlexHead during installation process. (Photo 5a)
- B. Attach sprinkler head, properly prepared with teflon tape and sealant to FlexHead Sprinkler Drop according to NFPA and sprinkler head manufacturer's guidelines. (Photo 5b)



- C. Adjust FlexHead Sprinkler height to accommodate type of sprinkler head. When sprinkler head is in desired location, tighten the fastening bolt on center hub of support bracket by turning clockwise hand tight plus 1 turn (100 inch lbs) with wrench as shown. After tightening the bolt, tighten the nut hand tight plus 1 turn (100 inch lbs) with wrench. (Photo 5c)

6. Installation of the FlexHead Ceiling Sprinkler System Is Complete

- Test installation of sprinkler system for any leaks per NFPA Guidelines.
- Install sprinkler escutcheon from below ceiling per manufacturers guidelines.

WARNING!

These installation instructions are for qualified and/or licensed technicians in the Fire Protection field **ONLY**. Consult NFPA, FM, UL, state and local code guidelines prior to installation.

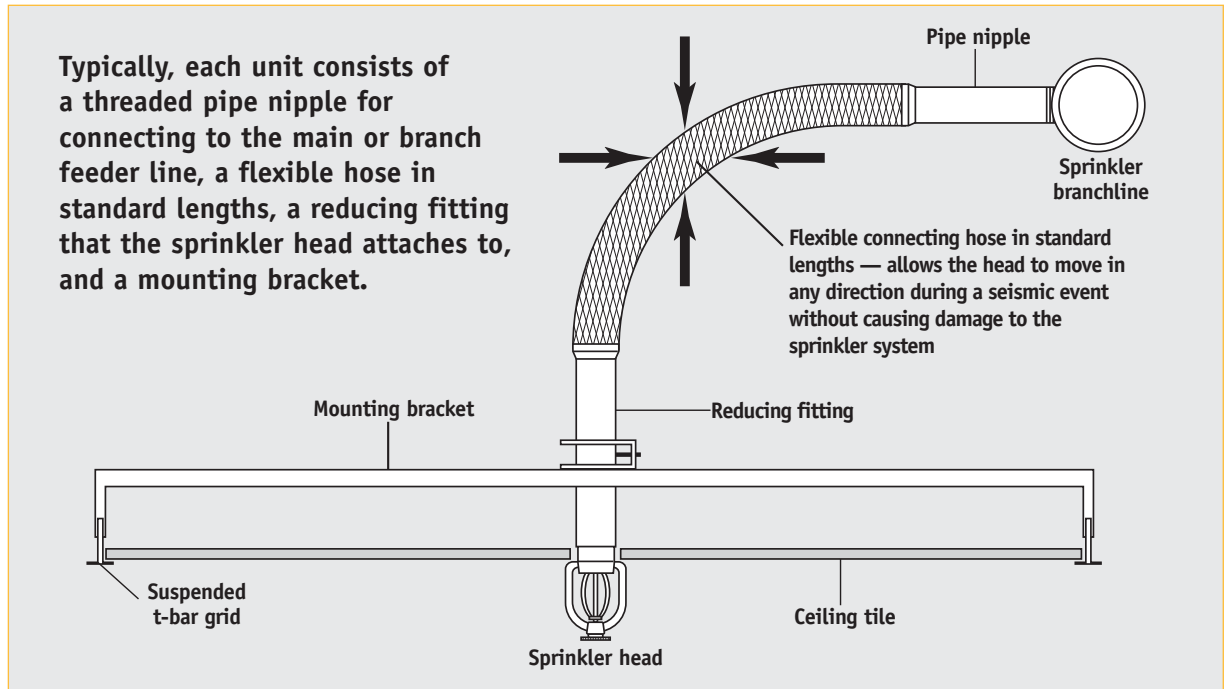
Failure to follow these specific instructions may cause personal injury. Installation technicians must read the entire manual prior to attempting installation of product. During maintenance or inspection of FlexHead product, facility fire protection system **MUST BE INACTIVE. DO NOT ATTEMPT RELOCATION OR MAINTENANCE WHEN FIRE PROTECTION SYSTEM IS "LIVE."**

NFPA 13 Code Language and Seismic Qualification

NFPA 13 Standard for Installation of Sprinkler Systems 2007 Edition

- 9.2.1.3.3*** Flexible Sprinkler Hose Fittings.
- A. 9.2.1.3.3** Examples of areas of use include clean rooms, suspended ceilings, and exhaust ducts.
- 9.2.1.3.3.1** Listed flexible sprinkler hose fittings and its anchoring components, intended for use in installations connecting the sprinkler piping to sprinklers, shall be installed in accordance with the requirements of the listing including any installation instructions.
- 9.2.1.3.3.2** When installed and supported by suspended ceilings, the ceiling shall meet ASTM C-635 and shall be installed in accordance with ASTM C-636.
- 9.2.1.3.3.3*** When flexible sprinkler hose fittings exceed 6 ft in length and are supported by a suspended ceiling a hanger(s) attached to the structure shall be required to ensure that the maximum unsupported length does not exceed 6 ft.
- A. 9.2.1.3.3.3** The committee evaluation of flexible sprinkler hose fittings supported by suspended ceilings was based upon a comparison of the weight of a 6 ft, 1 in diameter sch 40 water-filled flexible hose fitting weighing approximately 9 lbs. The information provided to the committee showed that the maximum load shed to the suspended ceiling by the flexible hose fitting was approximately 6 lbs and that a suspended ceiling meeting ASTM C-635, *Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension of Acoustical Tile and Lay-In Panel Ceilings*, and installed in accordance with ASTM C-636, *Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels*, can substantially support the load. In addition, the supporting material showed that the flexible hose connection can be attached to the suspended ceilings because it allows the necessary deflections under seismic conditions.

FlexHead[®] Satisfies New Seismic Code Requirements



FlexHead Industries recently satisfactorily completed full-scale seismic qualification testing at the Structural Engineering Earthquake Simulation Laboratory located at the State University of New York at Buffalo. Tests were conducted using the International Code Council (ICC) acceptance criteria “ICC-ES AC-156 Seismic Qualification Testing of Nonstructural Components”. This is the first time a sprinkler component has been seismically certified using test criteria accepted by the ICC.

- More than 90% of the states in the U.S. are adopting the International Building Code (IBC) that address, among other things, the installation of fire sprinkler systems in seismic zones.
- The latest version of the IBC defers to ASCE 7 for the sprinkler/ceiling design in Seismic Design Categories (SDC) C and D, E & F.
- In Seismic Design Category C, suspended ceilings are to be designed and installed in accordance with Ceilings & Interior Systems Construction Association (CISCA) recommendations for Zones 0-2; and sprinkler heads and other penetrations shall have a minimum of 1/4-inch clearance on all sides.
- In Seismic Design Categories D, E & F, suspended ceilings are to be designed and installed in accordance with CISCA recommendations for seismic Zones 3 and 4 with some additional requirements. Except where rigid braces are used to limit lateral deflections, sprinkler heads and other penetrations shall have a 2-inch oversized ring, sleeve, or adapter through the ceiling to allow for free movement of at least 1 inch of ceiling movement in all horizontal directions.
- Flexible sprinkler connection provide characteristics that exceed the most stringent seismic code requirements. The flexibility of the hose allows the head to move with the ceiling in any direction during a seismic event without causing damage to the sprinkler system.
- FlexHead Industries recently satisfactorily completed full-scale seismic qualification testing at the Structural engineering Earthquake Simulation Laboratory located at the State University of New York at Buffalo using the International Code Council (ICC) testing standard “ICC AC-156 Seismic Qualification Testing of Nonstructural Components”.

FLEXHEAD FRICTION LOSS DATA AND SPECIFICATIONS

FlexHead Model #	Internal I.D. in	Outlet Orifice Size in (cm)	Hose Assembly Length ft (cm)	Maximum Number of 90-degree Bends	Maximum Equivalent Length of Schedule 40, Nominal 1in. Diameter Pipe, ft		Maximum Ambient Temperature Rating F (C)	Maximum Rated Pressure psi (kPa) / psi (kPa)		Maximum K-factor
					FM	UL		Standard	H-Series	
2024, 2024H	1	1/2 (1.27)	2 (0.6)	3	18.4	11	300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
2036, 2036H	1	1/2 (1.27)	3 (0.9)	3	26.6	16	300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
2048, 2048H	1	1/2 (1.27)	4 (1.2)	4	30.3	24	300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
2060, 2060H	1	1/2 (1.27)	5 (1.5)	4	35.8	29	300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
2072, 2072H	1	1/2 (1.27)	6 (1.8)	4	45.6	35	300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
175psi, 300psi										
2024 75, 2024H 75	1	3/4 (1.90)	2 (0.6)	3	14.7	12	300 ^o (148 ^o)	175 (1205) / 300 (2068)		14.0
2036 75, 2036H 75	1	3/4 (1.90)	3 (0.9)	3	21.8	18	300 ^o (148 ^o)	175 (1205) / 300 (2068)		14.0
2048 75, 2048H 75	1	3/4 (1.90)	4 (1.2)	4	29.0	23	300 ^o (148 ^o)	175 (1205) / 300 (2068)		14.0
2060 75, 2060H 75	1	3/4 (1.90)	5 (1.5)	4	36.1	29	300 ^o (148 ^o)	175 (1205) / 300 (2068)		14.0
2072 75, 2072H 75	1	3/4 (1.90)	6 (1.8)	4	43.2	32	300 ^o (148 ^o)	175 (1205) / 300 (2068)		14.0
175psi, 300psi										
2024E, 2024HE	1	1/2 (1.27)	2 (0.6)	3	26.4, 14.7	19	300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
2036E, 2036HE	1	1/2 (1.27)	3 (0.9)	3	30.1, 21.8	23	300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
2048E, 2048HE	1	1/2 (1.27)	4 (1.2)	4	33.8, 29.0	27	300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
2060E, 2060HE	1	1/2 (1.27)	5 (1.5)	4	37.5, 36.1	32	300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
2072E, 2072HE	1	1/2 (1.27)	6 (1.8)	4	41.2, 43.2	35	300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
175psi, 300psi										
2024E 75, 2024HE 75	1	3/4 (1.90)	2 (0.6)	3	14.7	18	300 ^o (148 ^o)	175 (1205) / 300 (2068)		14.0
2036E 75, 2036HE 75	1	3/4 (1.90)	3 (0.9)	3	21.8	23	300 ^o (148 ^o)	175 (1205) / 300 (2068)		14.0
2048E 75, 2048HE 75	1	3/4 (1.90)	4 (1.2)	4	29.0	23	300 ^o (148 ^o)	175 (1205) / 300 (2068)		14.0
2060E 75, 2060HE 75	1	3/4 (1.90)	5 (1.5)	4	36.1	29	300 ^o (148 ^o)	175 (1205) / 300 (2068)		14.0
2072E 75, 2072HE 75	1	3/4 (1.90)	6 (1.8)	4	43.2	32	300 ^o (148 ^o)	175 (1205) / 300 (2068)		14.0
175psi, 300psi										
2036F	1.25	1/2 (5.6)	3 (0.9)	3	16.0		300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
2048F	1.25	1/2 (5.6)	4 (1.2)	4	19.6		300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
2072F	1.25	1/2 (5.6)	6 (1.8)	4	22.8		300 ^o (148 ^o)	175 (1205) / 300 (2068)		5.62
175psi, 300psi										
2036F75	1.25	3/4 (14)	3 (0.9)	3	9.3		300 ^o (148 ^o)	175 (1205)		14.0
2048F75	1.25	3/4 (14)	4 (1.2)	4	11.4		300 ^o (148 ^o)	175 (1205)		14.0
2072F75	1.25	3/4 (14)	6 (1.8)	4	15		300 ^o (148 ^o)	175 (1205)		14.0
175psi, 300psi										
2036F100	1.25	1 (14)	3 (0.9)	3	7.1		300 ^o (148 ^o)	175 (1205)		22.4
2048F100	1.25	1 (14)	4 (1.2)	4	8.3		300 ^o (148 ^o)	175 (1205)		22.4
2072F100	1.25	1 (14)	6 (1.8)	4	10.1		300 ^o (148 ^o)	175 (1205)		22.4

Model Numbers: The "H" designates high pressure unit rated to 300 psig and the "E" designates elbow style unit. The "F" designates high flow rate using 1 1/4" internal hose diameter.

FlexHead products are intended for use in hydraulically designed wet, pre-action, deluge or dry pipe sprinkler connections per NFPA 13, 13R, and 13D guidelines. The hydraulic loss of the FlexHead connector needs to be included in the hydraulic design calculations the same as a valve or fitting. *Each FlexHead sprinkler drop has a 3" minimum bend radius per UL guidelines, and a 8" minimum bend radius per FM guidelines.*

****FM Equivalent Length Numbers include maximum "K" factor sprinkler head that is listed.****

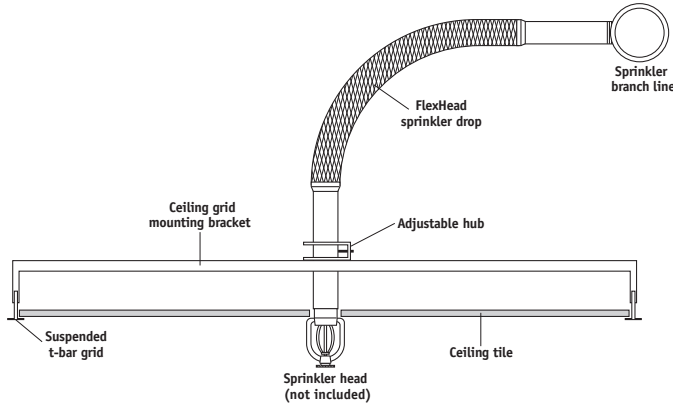
* Equivalent lengths are shown with maximum number of 90 degree bends at the minimum bend-radius. Different values were obtained by FM and UL due to the differences in minimum bend radius, testing protocol and calculation methods. Please see individual testing standards for more information relative to friction loss (Equivalent Length of Pipe).



A PART OF **Atkore** INTERNATIONAL

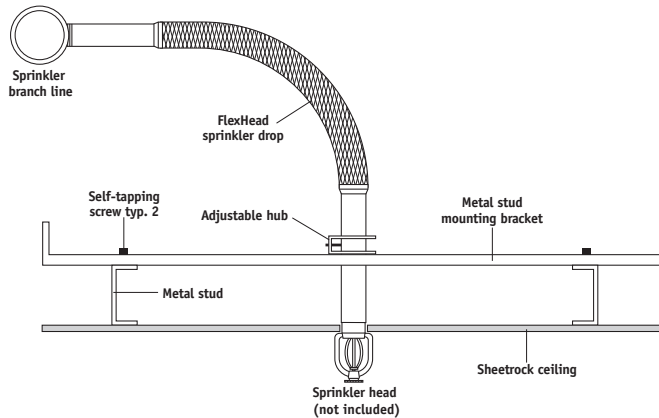
56 Lowland Street, Holliston, MA 01746
Toll-Free 800-829-6975 • Fax 508-893-6020

FlexHead Suspended Ceiling Detail



Each FM approved and UL listed unit is ready to install, pressure- and leak-tested, and comes complete with a flexible stainless steel hose and mounting bracket with adjustable hub.

FlexHead Sheetrock Ceiling Detail

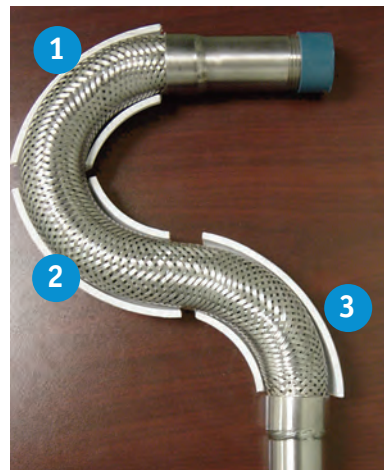


FlexHead 3" Bend Radius per UL Guidelines (2 Bends Shown)

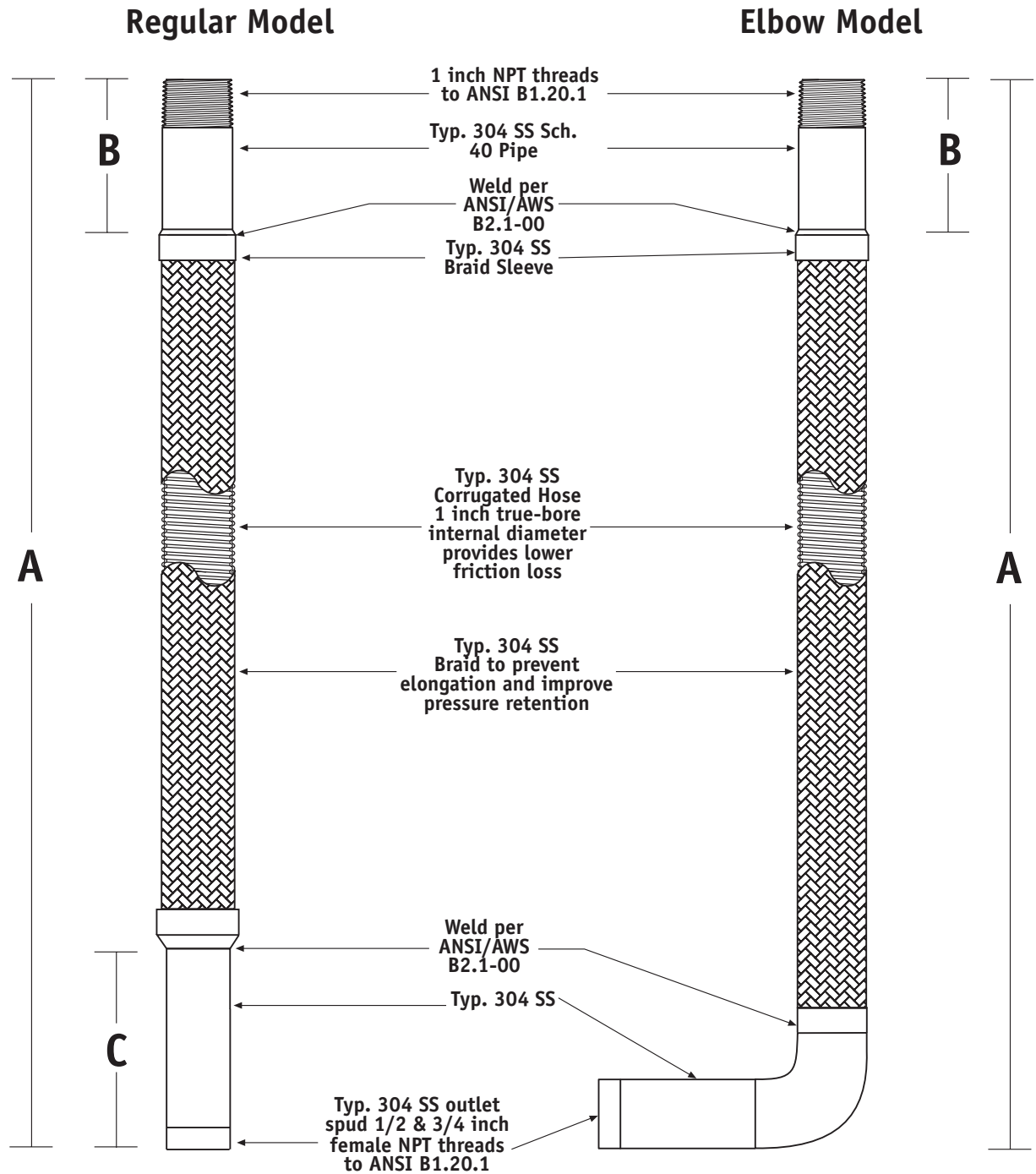


*Must have 8" bend radius per FM guidelines

FlexHead Shown with 3 Bends



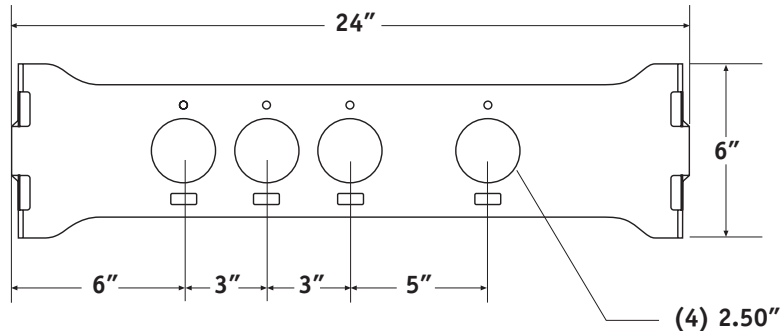
Hose Specification Sheet



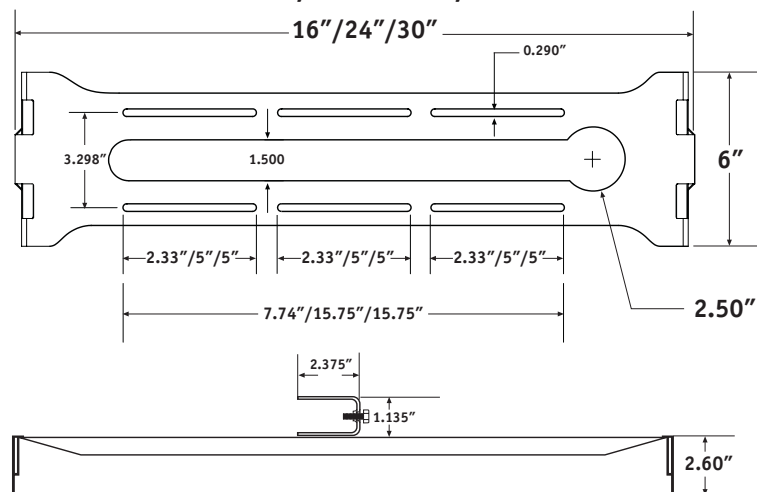
Model #	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)
2024/2024E	24	3	4.5	1.5, 3, 4	3.5, 5, 6
2036/2036E	36	3	4.5	1.5, 3, 4	3.5, 5, 6
2048/2048E	48	3	4.5	1.5, 3, 4	3.5, 5, 6
2060/2060E	60	3	4.5	1.5, 3, 4	3.5, 5, 6
2072/2072E	72	3	4.5	1.5, 3, 4	3.5, 5, 6

Bracket Specification Sheet

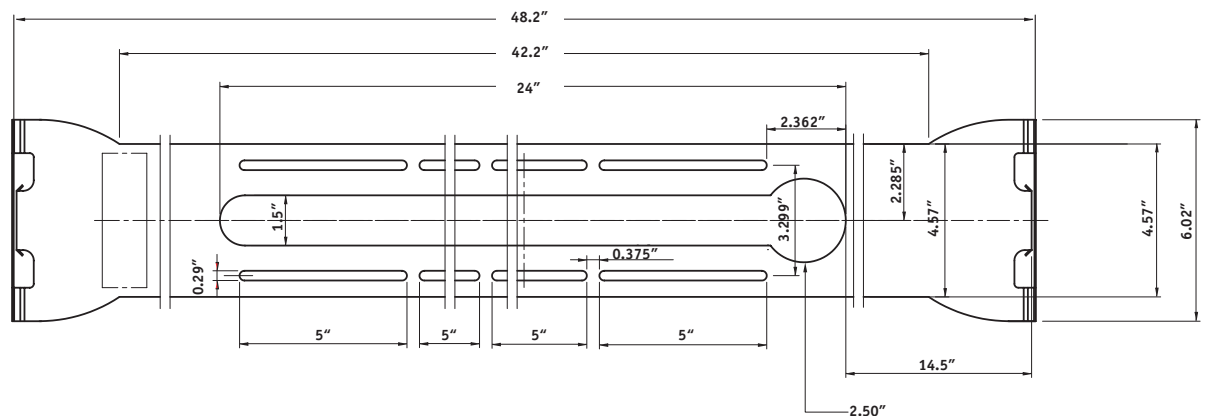
Multiport Design (For use with T-bar and Metal Stud applications)
Model #: MP24BKT2



Adjustable Design (For use with T-bar, Metal Stud, and Chicago Grid applications): standard sizes are 16", 24" and 30" long
Model #: AD16BKT2/AD24BKT2/AD30BKT2



Adjustable Design (for use with T-bar, Metal Stud, and Chicago Grid applications):
standard size 48" long
Model #: AD48BKT2



FlexHead Commercial Products



24", 36", 48", 60", 72" hose lengths,
Rated working pressure 175psi, optional
300psi.
Straight model,
Standard 1" I.D., optional 1¼" I.D.
Model #: see page 5.



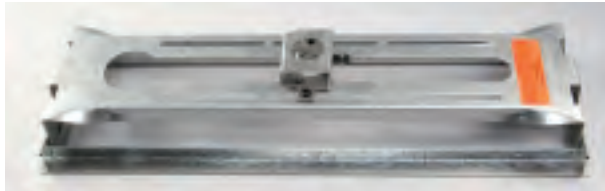
24", 36", 48", 60", 72" hose lengths.
Rated working pressure 175psi, optional
300psi.
Elbow model.
Standard 1" I.D., optional 1¼" I.D.
Model #: see page 5.



24" Multiport Bracket for T-bar Grid or
Metal Stud applications.
Model #: MP24BKT2 (standard bracket).



16"/24"/30" Adjustable Bracket for
T-bar Grid, Chicago Grid or Metal Stud
applications.
Model #: AD16BKT2/AD24BKT2/AD30BKT2.



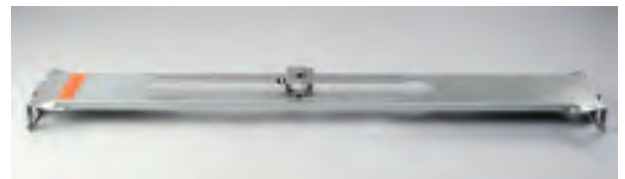
Hat Channel Bracket System for Metal
Stud or Hat Channel applications.
Model #: AD24BKT2 with BKT-HTA.



Armstrong® TechZone Ceiling Bracket
for use with Armstrong TechZone Ceiling
systems. Available in both 4" and 6" long.
Model #: SP04BKT2/SP06BKT2.



Bracket for Confined Space applications
having a concrete deck above the ceiling.
Model #: UH-2.



48" Adjustable Bracket for T-bar Grid or
Metal Stud applications.
Model #: AD48BKT2.

Examples where Flexible Sprinkler Hose Fittings are used:



Suspended Ceilings



Exhaust Ducts



Institutional



Cleanroom Ceilings



Flexible Sprinkler Hose Fittings were developed to satisfy specific needs of the industry, save the industry millions in losses, provide superior seismic protection and promote the installation of sprinklers. They have been evaluated for use by both

Underwriters Laboratory and FM approvals and are tested to approval standards that were independently developed by the testing laboratories. The first listing for a Flexible Sprinkler Hose Fitting was in 1990.

Testing and Approvals

FM Global Testing — Approval Standard FM1637*

FlexHead® series 2000 stainless steel sprinkler connections

Hydrostatic Strength Test

A sample FlexHead was subjected to a hydrostatic pressure of four (4) times the rated working pressure of 175 psi (1205 kpa) to 700 psi (4825 kpa) for a period of five minutes. The assembly showed no signs of rupture, cracking, permanent distortion, or deterioration of performance characteristics. *The FlexHead successfully passed this test.*

Vibration Test

A sample FlexHead was secured to a vibration table. The FlexHead hose was bent in a 90° angle and pressurized to 90 psi (620 kpa) and the mounting bracket and hose were then subjected to a total of 25 hours of severe vibration conditions. After the successful completion of the vibration tests the sample was subjected to the hydrostatic pressure test at 700 psi and showed no signs of deterioration. *The FlexHead successfully passed this test.*

Friction Loss (Equivalent length of pipe)

To determine the effect of the FlexHead to the discharge coefficient of the sprinkler, the average friction loss through the FlexHead shall be equated to the theoretical length of nominal 1" diameter schedule 40 sprinkler pipe which would produce the same amount of friction loss. *Please see friction loss table.*

Vacuum Test

A sample FlexHead was subjected to a vacuum of 25 inHG for a period of five minutes. After the successful completion of the Vacuum Test the sample was subjected to the hydrostatic pressure test at 700 psi and showed no signs of deterioration. *The FlexHead successfully passed this test.*

Pressure Cycling Test

A sample FlexHead was filled with water and bent at a 90° angle and subjected to 20,000 cycles of pressure varying from 0 psi (0 kpa) to 175 psi (1205 kpa) at a rate of approximately 6 cycles per minute. After the successful completion of the pressure cycling tests the sample was subjected to the hydrostatic pressure test at 700 psi and showed no signs of deterioration. *The FlexHead successfully passed this test.*

Fatigue Test

A sample FlexHead was subjected to 50,000 cycles of repeated flexing at a rate of 5 to 30 cycles per minute per section 8.3 of ISO standard 10380. After the successful completion of the fatigue test the sample was subjected to the hydrostatic pressure test at 700 psi and showed no signs of deterioration. *The FlexHead successfully passed this test.*

Head Deployment

A sample FlexHead installed in a suspended ceiling was fitted with a sprinkler head and pressurized to 26–175 psi. The sprinkler head was then activated by a heat source at various pressures, and the sprinkler head deployed. The assembly showed no signs of distortion or deterioration of performance on the assembly or sprinkler head. *The FlexHead successfully passed this test.*

* Condensed Summary — Please see approval standard for full testing and approval criteria.



APPROVED

FLEXIBLE SPRINKLER HOSE WITH FITTINGS FOR COMMERCIAL SUSPENDED CEILINGS

Flexible sprinkler hose with threaded end fittings are for use in commercial suspended ceilings. The flexible hoses are to be installed according to the manufacturer’s directives. Unless indicated, the hoses have a rated working pressure of 175 (1205 kPa).

Flexhead Industries, Inc. 56 Lowland St, Holliston MA 01746

Model	NPT in.	Hose Assembly length ft (m)
2024/2024 75	1/2 / 3/4	2 (0.6)
2036/2036 75	1/2 / 3/4	3 (0.9)
2048/2048 75	1/2 / 3/4	4 (1.2)
2060/2060 75	1/2 / 3/4	5 (1.5)
2072/2072 75	1/2 / 3/4	6 (1.8)

This is a standard flexible hose with a pressure rating of 175 psi (1205 kPa). Approval on these models of flexible metal sprinkler hose is limited for use in commercial suspended ceilings, with a ceiling bracket system manufactured by FlexHead Industries Inc. The brackets are identified below.

Model	NPT in.	Hose Assembly length ft (m)
2024E	1/2	2 (0.6)
2036E	1/2	3 (0.9)
2048E	1/2	4 (1.2)
2060E	1/2	5 (1.5)
2072E	1/2	6 (1.8)

This is a standard flexible hose with a pressure rating of 175 psi (1205 kPa). Approval on these models of flexible metal sprinkler hose incorporates a stainless steel elbow welded on the outlet end of hose and are limited for use in commercial suspended ceilings, with a ceiling bracket system manufactured by FlexHead Industries Inc. The brackets are identified below.

Model	NPT in.	Hose Assembly length ft (m)
2024H	1/2	2 (0.6)
2036H	1/2	3 (0.9)
2048H	1/2	4 (1.2)
2060H	1/2	5 (1.5)
2072H	1/2	6 (1.8)

The “H” designation indicates a pressure rating of 300 psi (2070 kPa). Approval on these models of flexible metal sprinkler hose is limited for use in commercial suspended ceilings, with a ceiling bracket system manufactured by FlexHead Industries Inc. The brackets are identified below.

Model	NPT in.	Hose Assembly length ft (m)
2024I	1/2	2 (0.5)
2036I	1/2	3 (0.9)
2048I	1/2	4 (1.2)
2060I	1/2	5 (1.5)
2072I	1/2	6 (1.8)

The “I” designation indicates and “Institutional” flexible hose with a pressure rating of 175 psi (1205 kPa). Approval of these models of flexible metal sprinkler hose is limited for use with pendant and horizontal sidewall applications with a UH-1 ceiling/wall bracket manufactured by FlexHead Industries.

The different FlexHead Industries, Inc. Brackets are identified as follows:

Part Number

MP-24-BKT-2

SP-06-TZ-BKT

AD-16-BKT-2

AD-24-BKT-2

AD-30-BKT-2

AD-48-BKT-2

TZ = Tech Zone

AD = Adjustable

BKT = Bracket

06 = Length in inches of bracket

16 = Length in inches of bracket

24 = Length in inches of bracket

30 = Length in inches of bracket

48 = Length in inches of bracket

Testing and Listings

Underwriters Laboratory Testing — Listing Standard UL2443*

FlexHead® series 2000 stainless steel sprinkler connections

Hydrostatic Pressure Test

The sample length is to be measured and then the hydrostatic pressure increased to 1.5 times the rated working pressure and held for 1 minute. The sample length is then to be measured again and the length shall not change by more than 0.1 inch/foot of hose length.

Mechanical Strength Test

A flexible sprinkler hose with fittings installed in its intended position using the anchoring components referenced in the installation instructions shall withstand a torque of 60 pound-feet (81 Nm) applied to the outlet without movement of the fitting outlet, deformation, or fracture.

High Temperature Exposure Test

Two samples are to be prepared and subjected to a hydrostatic pressure of twice the rated working pressure. The samples are then to be allowed to dry and then exposed to an ambient temperature in accordance with Table 10.1 for 90 days. Following this exposure, the samples are to be individually subjected to a hydrostatic pressure of twice the rated working pressure for 1 minute.

Vibration Test

Samples are to be vibrated for a period of 30 hours at frequencies ranging from 18 to 37 Hz. During and after being subjected to the required vibration, the samples are to be examined for signs of leakage, rupture, or movement of the outlet fitting affecting the performance of the flexible hose assembly.

Equivalent Length Determination

A sample of each length shall be tested in straight lengths and with the maximum number of minimum radii bends referenced in the installation instructions. The calculated pressure loss from the piezometers, corrected for the inlet and outlet velocities, are to be subtracted from the test sample results to obtain a pressure drop for the fitting. Using the Hazen-Williams coefficient of friction of 120, the equivalent length, in feet (m) of pipe, is to be calculated.

Salt Spray Corrosion Test

Ferrous flexible sprinkler hose with fittings and ferrous anchoring components not protected with a coating shall withstand an exposure to a salt spray atmosphere for 10 days without exhibiting any incipient corrosion.

Stress-Corrosion Cracking of Stainless Steel Parts Test

Austenitic stainless steel parts shall show no evidence of cracking, delamination, or degradation after being subjected to boiling magnesium chloride solution. The exposure is to last for 150 hours. The test samples are to be examined using a microscope having a magnification of 25X for any cracking, delamination, or other degradation as a result of the test exposure.

Low Temperature Test for Dry Pipe Systems

Each sample is to be gradually pressurized with air to a pressure of 40 psig (276 kPa) and then sealed. The pressurized assembly is then to be placed horizontally in air maintained at a temperature of minus 40°F (minus 40°C) for a period of 24 hours. Following the 24 hour low temperature exposure, the assembly is to be placed in room ambient temperature of 73 ±5°F (23 ±3°C) for an additional 24 hour period. There shall be no decrease in the pressure in the assembly from the pressure measured before the low temperature exposure.

Pressure Cycling Test

The samples are to be connected to a pressure cycling apparatus, filled with water and vented of all air. The internal pressure is to be cycled 3,000 times from 0 psig (0 kPa) to twice the rated working pressure to 0 psig (0 kPa) at an approximate rate of 10 cycles per minute. During the pressure cycling, observations are to be made for evidence of leakage or physical damage.

Vacuum Test

Flexible sprinkler hose with fittings shall withstand a vacuum of minus 8.84 psi (minus 61 kPa) without collapse, leakage, or other deterioration of the flexible sprinkler hose and fitting performance characteristics.

High Pressure Flow Test

Flexible sprinkler hose with fittings and its anchoring components shall maintain the attached sprinkler in the intended operating position while the sprinkler discharges water at 90 percent of the rated pressure of the flexible sprinkler hose.

Fatigue Test (Limited Flexibility)

Flexible hose with fittings shall withstand without leakage or damage repeated flexing in a direction parallel to the axis of the end fittings. The number of flexing cycles shall be 100 cycles.

* Condensed Summary — Please see approval standard for full testing and approval criteria.

Testing and Listings

Underwriters Laboratory Testing — VNF.EX5269

Flexible Sprinkler Hose with Fittings

See General Information for Flexible Sprinkler Hose with Fittings

FLEXHEAD INDUSTRIES

EX5269

LOWLAND IND PARK

56 LOWLAND ST

HOLLISTON, MA 01746 USA

Model	Rated Pressure psig	Max Ambient Temp, °F	Nom Inlet by Outlet Size, in.	Assembly Length ft (mm)	Max No. of 90° Bends	Min Bend Radius, in.	Equivalent Length of 1 in. Schedule 40 Steel Pipe (C=120), ft	Flexibility Type
2024	175	300	1 by 1/2	2	3	3	11	Limited
2036	175	300	1 by 1/2	3	3	3	16	Limited
2048	175	300	1 by 1/2	4	4	3	24	Limited
2060	175	300	1 by 1/2	5	4	3	29	Limited
2072	175	300	1 by 1/2	6	4	3	35	Limited
2024	175	300	1 by 3/4	2	3	3	12	Limited
2036	175	300	1 by 3/4	3	3	3	18	Limited
2048	175	300	1 by 3/4	4	4	3	23	Limited
2060	175	300	1 by 3/4	5	4	3	29	Limited
2072	175	300	1 by 3/4	6	4	3	32	Limited
2024H	300	300	1 by 1/2	2	3	3	11	Limited
2036H	300	300	1 by 1/2	3	3	3	16	Limited
2048H	300	300	1 by 1/2	4	4	3	24	Limited
2060H	300	300	1 by 1/2	5	4	3	29	Limited
2072H	300	300	1 by 1/2	6	4	3	35	Limited
2024H	300	300	1 by 3/4	2	3	3	12	Limited
2036H	300	300	1 by 3/4	3	3	3	18	Limited
2048H	300	300	1 by 3/4	4	4	3	23	Limited
2060H	300	300	1 by 3/4	5	4	3	29	Limited
2072H	300	300	1 by 3/4	6	4	3	32	Limited
2024E	175	300	1 by 1/2	2	3	3	19	Limited
2036E	175	300	1 by 1/2	3	3	3	23	Limited
2048E	175	300	1 by 1/2	4	4	3	27	Limited
2060E	175	300	1 by 1/2	5	4	3	32	Limited
2072E	175	300	1 by 1/2	6	4	3	35	Limited
2024E	175	300	1 by 3/4	2	3	3	18	Limited
2036E	175	300	1 by 3/4	3	3	3	23	Limited
2048E	175	300	1 by 3/4	4	4	3	23	Limited
2060E	175	300	1 by 3/4	5	4	3	29	Limited
2072E	175	300	1 by 3/4	6	4	3	32	Limited
2024HE	300	300	1 by 1/2	2	3	3	19	Limited
2036HE	300	300	1 by 1/2	3	3	3	23	Limited
2048HE	300	300	1 by 1/2	4	4	3	27	Limited
2060HE	300	300	1 by 1/2	5	4	3	32	Limited
2072HE	300	300	1 by 1/2	6	4	3	35	Limited
2024HE	300	300	1 by 3/4	2	3	3	18	Limited
2036HE	300	300	1 by 3/4	3	3	3	23	Limited
2048HE	300	300	1 by 3/4	4	4	3	23	Limited
2060HE	300	300	1 by 3/4	5	4	3	29	Limited
2072HE	300	300	1 by 3/4	6	4	3	32	Limited

These flexible sprinkler hose with fittings are intended to be installed in accordance with the manufacturer's installation instructions.

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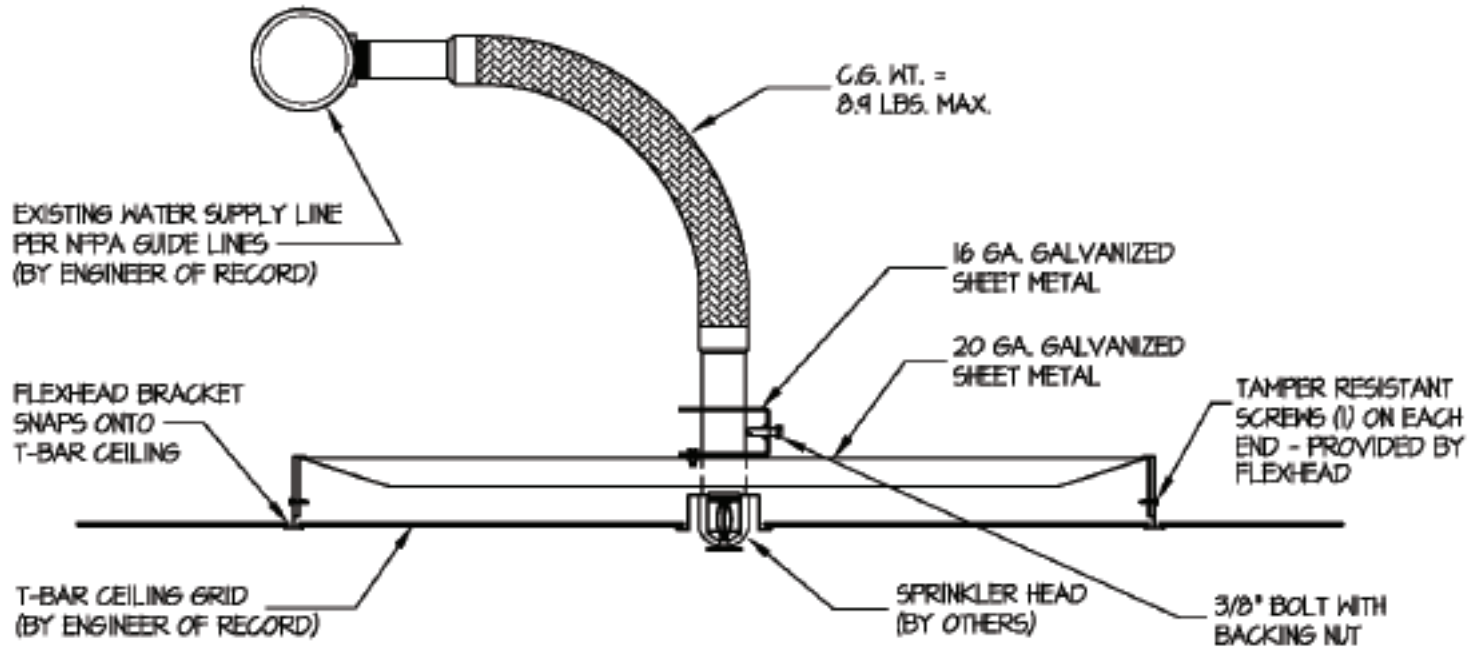
The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL's Follow-Up Service. Only those products bearing the UL Mark should be considered to be Listed and covered under UL's Follow-Up Service. Always look for the Mark on the product.

FLEXHEAD INDUSTRIES FLEXHEAD SPRINKLER CONNECTIONS MODEL # 2024, 2036, 2048, 2060, 2072	DES. R. LA BRIE	SHEET 1
	JOB NO. 11-0788	OF 2 SHEETS
	DATE 9/24/09	

SEISMIC ANCHORAGE PRE-APPROVED DETAIL

CEILING MOUNT

Office of Statewide Health Planning and Development
ANCHORAGE PRE-APPROVAL



ELEVATION

GENERAL NOTES:

- ANCHORAGE DESIGN PER 2007 CALIFORNIA BUILDING CODE - SECTION 1613A AND ASCE 7-05 SECTIONS 12 AND 13. ALLOWABLE STRESS DESIGN IS USED.
 HORIZONTAL FORCE (E_h) = $2.43 W_p$ ($S_{DS} = 1.93, I_p = 1.5, a_p = 2.5, R_p = 2.5$)
 VERTICAL FORCE (E_v) = $0.21 W_p$
- ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN.
- ENGINEER OF RECORD TO VERIFY CONNECTION WILL PERMIT ADEQUATE DISPLACEMENT IN ALL DIRECTIONS.





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Northbrook, Illinois 60062-2098
United States Country Code (1)
(847) 272-8800
FAX No. (847) 272-2020
<http://www.ul.com>



June 21, 2001

FlexHead Industries
Mr. Norm MacDonald
56 Lowland St.
Holliston, MA 01746

Our Reference: File EX5269
Subject: FlexHead Flexible Sprinkler Hose Fittings Installed Onto Dry Wall Ceiling Grid

Dear Mr. MacDonald:

This letter is in regard to the subject.

Base upon review of the FlexHead UL Listed flexible sprinkler hose fitting system, installation onto a dry wall ceiling grid is acceptable when the ceiling-mounted bracket is screwed to a rigid surface. Self-tapping screws are used to affix the FlexHead mounting bracket to the surface, using the four ports provided which are pre-drilled onto the mounting bracket.

Very truly yours,

EMIL W. MISICHKO (Ext. 42036)
Engineering Group Leader
Conformity Assessment Services
Department 3011CNBK
[Emil W. Misichko@us.ul.com](mailto:Emil.W.Misichko@us.ul.com)

A not-for-profit organization
dedicated to public safety and
committed to quality service



National Fire Protection Association

1 Batterymarch Park, Quincy, MA 02169-3471
Phone: 617-770-3000 • Fax: 617-770-3754 • www.nfpa.org

November 15, 2006

Mr. Norman MacDonald
President
FlexHead Industries, Inc.
56 Lowland Street
Holliston, MA 01746

Fax: 508-893-6020

Dear Mr. MacDonald,

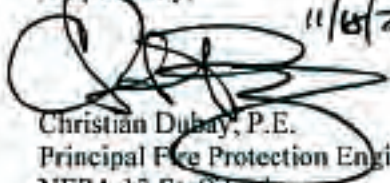
This letter is in response to your email dated November 13, 2006 which discussed listed flexible sprinkler hoses, specifically FlexHead. Your question relates to the acceptability of listed technology which was not specifically addressed in previous editions of NFPA 13, including the 1999 and 2002 editions.

NFPA 13, 1999 Section 1-2 and NFPA 13, 2002 Section 1.6 provide specific text that addresses new technology. It is the intent of the current and previous editions of NFPA 13 to allow the use of listed technologies where they are not specifically addressed in NFPA 13. The base requirement is that they be installed in compliance with all of the listing requirements and manufacturers' instructions. These statements have been provided by the technical committees to address the very situation that you have described. In essence, where a new technology is developed, tested and listed as acceptable for automatic fire sprinkler use it can be utilized in accordance with NFPA 13 with no additional requirements other than those in the listing and manufacturers' instructions.

In summary it is the intent of NFPA 13 to permit the use of technologies, equipment and materials not specifically addressed in NFPA 13 where they are specifically listed for fire sprinkler use and where they have been installed in accordance with the listing requirements and the manufacturers' instructions.

Please be aware that this response does not constitute a Formal Interpretation as explained in the Important Notice below.

Respectfully,


11/15/2006
Christian Dubay, P.E.
Principal Fire Protection Engineer
NFPA 13 Staff Liaison

File: NFPA 13

Important Notice: This correspondence is not a Formal Interpretation issued pursuant to NFPA regulations. Any opinion expressed is the personal opinion of the author, and does not necessarily represent the official position of the NFPA or its Technical Committees. In addition, this correspondence is neither intended, nor should be relied upon, to provide professional consultation or services.



NYC Department of Buildings
250 Broadway, New York, NY 10007

Patricia Lancaster, F.A.A., Commissioner

Donald Gottfried, P.E.
Director

Materials and Equipment Acceptance
Phone: (212) 586-3282
Fax: (212) 586-3840
E-mail: donaide@buildings.nyc.gov

July 17, 2007

Mr. Peter M. MacDonald
FlexHead Industries
56 Lowland Street
Holliston, MA 01746

Dear Mr. MacDonald:

Enclosed is a final official signed copy of MEA acceptance of your product, MEA 261-99-E Vol. 3, which you may use as proof of your product acceptance in New York City.

This document, together with proper labeling and installation in accordance with New York City Building Code, will enable the inspector to know that the product installed is legal.

All shipments and deliveries of accepted materials to the job site are required to be labeled or tagged in accordance with the format below:

Accepted For Use
City of New York
Department of Buildings
MEA 261-99-E Vol. 3
Company Name

Sincerely,

Donald Gottfried, P.E.

C: Deborah F. Taylor, AIA, LEED AP
Executive Director, Special Projects and MEA

Limited Warranty

FlexHead Industries, Inc. warrants that its products will be free from defects in materials and workmanship under normal conditions of use and service for a period of one year from date of sale. Our obligation under this warranty is limited to repairing or replacing any product that is returned to us with transportation charges prepaid within one year after the date of original sale and that our examination shows to our satisfaction to have been defective in materials or workmanship under normal conditions of use and service. The decision as to whether to repair or to replace any product shall be made by us, and any repair shall be made at our facility.

Notwithstanding the foregoing, the following are specifically excluded from the coverage of this warranty:

(a) the sprinkler head of any FlexHead Industries, Inc. product, but FlexHead Industries, Inc. hereby assigns to the original purchaser of any such product the right to enforce the warranty, if any, issued by the manufacturer of such sprinkler head; (b) defects resulting from ordinary wear and tear, including, without limitation, the replacement of the so called poly bag components of any FlexHead Industries, Inc. product; (c) products that have been altered in any manner by the buyer or by anyone other than FlexHead Industries, Inc.; (d) products that have been subjected to misuse, abusive use, or damage by accident or casualty; (e) products that have been installed or used in a manner contrary to our specifications, instructions or recommendations, (f) products that have been installed or used in a manner that is not in compliance with all applicable requirements of any code, law, regulation or rule of any federal, state or local governmental or industry authority; and (g) products that have not been inspected and maintained in accordance with our

specifications, instructions or recommendations, including, without limitation, our recommendations as to following the inspection and maintenance standards published by Factory Mutual Research Corporation (FMRC) and the National Fire Protection Association (NFPA); and (h) products that have been affected by Microbiologically Influenced Corrosion (MIC). This warranty is not assignable and shall benefit only the original purchaser of a FlexHead Industries, Inc. product. If any provision hereof or any portion of any provision shall be held invalid, the remainder of this Limited Warranty shall not be affected thereby, and all provisions of this Limited Warranty shall remain valid and in full force and effect to the fullest extent permitted by law. THIS WARRANTY IS IN LIEU OF ALL IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY AND WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. NOTWITHSTANDING ANY PROVISION TO THE CONTRARY HEREIN OR ANY APPLICABLE LAW TO THE CONTRARY, IN NO EVENT SHALL FLEXHEAD INDUSTRIES, INC. BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES UNDER ANY CIRCUMSTANCES WHATSOEVER, WHETHER ARISING FROM ANY BREACH OF THIS LIMITED WARRANTY OR OTHERWISE ARISING FROM OR IN CONNECTION WITH THE USE OR OPERATION OF, OR ANY DEFECT IN, ANY FLEXHEAD INDUSTRIES, INC. PRODUCT, OR OTHERWISE. The risk of damages from any breach of warranty with respect to injury to any person will be born by the purchaser of FlexHead Industries, Inc. product.

FlexHead commercial fire sprinkler connections

Your security is our business.

FlexHead Industries was founded in 1992 to help engineers, builders and owners increase the safety of their buildings. Our patented sprinkler connection technologies show that it's possible to comply with codes cost-effectively. We're proud to help reduce the risks of property damage and loss of life in a wide variety of buildings, domestically and world-wide.



FlexHead manufactures sprinkler connections for all types of applications including:

Commercial

- Government
- Hospitals
- Offices
- Restaurants
- Retail
- Schools

Cleanrooms

- Biotechnology
- Electronics
- High-end commercial ceilings
- Pharmaceuticals
- Semiconductors

Exhaust ducts

- Aerospace
- Automotive
- Biotechnology
- Electronics
- Forest products/paper pulp
- Laboratories
- Petrochemical
- Pharmaceuticals
- Restaurants
- Semiconductors
- Steel manufacturers

Institutions

- Concrete penetrations for sidewall and pendant applications
- Correctional centers
- Mental health facilities

Seismically qualified.

FlexHead connections allow for independent movement between sub-mains and ceilings. They're the only flexible sprinkler connection to be qualified for use in Seismic Design Categories C, D, E and F.

FLEXHEAD[®]

INDUSTRIES

The pioneers in flexible fire protection



U.S. and international patents pending: #6,123,154, #6,119,784, #6,752,218, #7,032,680, #6,488,097.

The FlexHead name and logo are trademarks of FlexHead Industries.

FBC™ System Compatible indicates that this product has been tested, and is monitored on an ongoing basis, to assure its chemical compatibility with FlowGuard Gold®, BlazeMaster® and Corzan® pipe fittings. FBC™, FlowGuard Gold®, BlazeMaster® and Corzan® are licensed trademarks of The Lubrizol Corporation.

USGBC® and LEED® are registered trademarks of the U.S. Green Building Council.

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(508) 893-9596
fax (508) 893-6020
info@flexhead.com
www.flexhead.com

SECTION 2
FIRE SPRINKLERS

Reliable®

Model F1FR Series Quick Response Standard Spray

Model F1FR56 Sprinkler Types

Standard Upright
Standard Pendent
Conventional
Vertical Sidewall
Horizontal Sidewall

Model F1FR56 Recessed Sprinkler Types

Standard Pendent/F1/F2/FP
Horizontal Sidewall

Model F1FR56 Concealed Sprinkler Types

Standard Pendent

Model F1FR42, F1FRXLH & F1FR28 Sprinkler Types

Standard Upright
Standard Pendent

Model F1FR42, F1FRXLH & F1FR28 Recessed Sprinkler Types

Standard Pendent

Model F1FR56LL & F1FR42LL Low Lead Sprinkler Types*

Standard Pendent
Less than 0.25% Lead Content

Listing & Approvals

1. Underwriters Laboratories Inc. and Certified for Canada (cULus).
2. Factory Mutual Approvals (FM)
3. Loss Prevention Council (LPCB, UK)
4. VdS Schadenverhütung GmbH
5. *NSF Certified to NSF/ANSi Standard 61 Annex G

UL Listing Category

Sprinklers, Automatic & Open (VNIV)
Quick Response Sprinkler

Product Description

Reliable Models F1FR56, F1FR56LL, F1FR42, F1FR42LL, F1FRXLH & F1FR28 Series Sprinklers are quick response sprinklers which combine the durability of a standard sprinkler with the attractive low profile of a decorative sprinkler.

The Models F1FR56, F1FR56LL, F1FR42, F1FR42LL, F1FRXLH & F1FR28 Series Recessed automatic sprinklers utilize a 3.0 mm frangible glass bulb. These sprinklers have demonstrated response times in laboratory tests which are five to ten times faster than standard response sprinklers. This quick response enables the Model F1FR56, F1FR56LL, F1FR42, F1FR42LL, F1FRXLH & F1FR28 Series sprinklers



Upright

Pendent

Conventional



Vertical Sidewall

Horizontal Sidewall

Recessed
Pendent/F1/F2Recessed
Horizontal SidewallConcealed
PendentRecessed
Pendent/FP

XLH Upright

XLH Pendent

XLH Recessed
Pendent F1/F2

to apply water to a fire much faster than standard sprinklers of the same temperature rating.

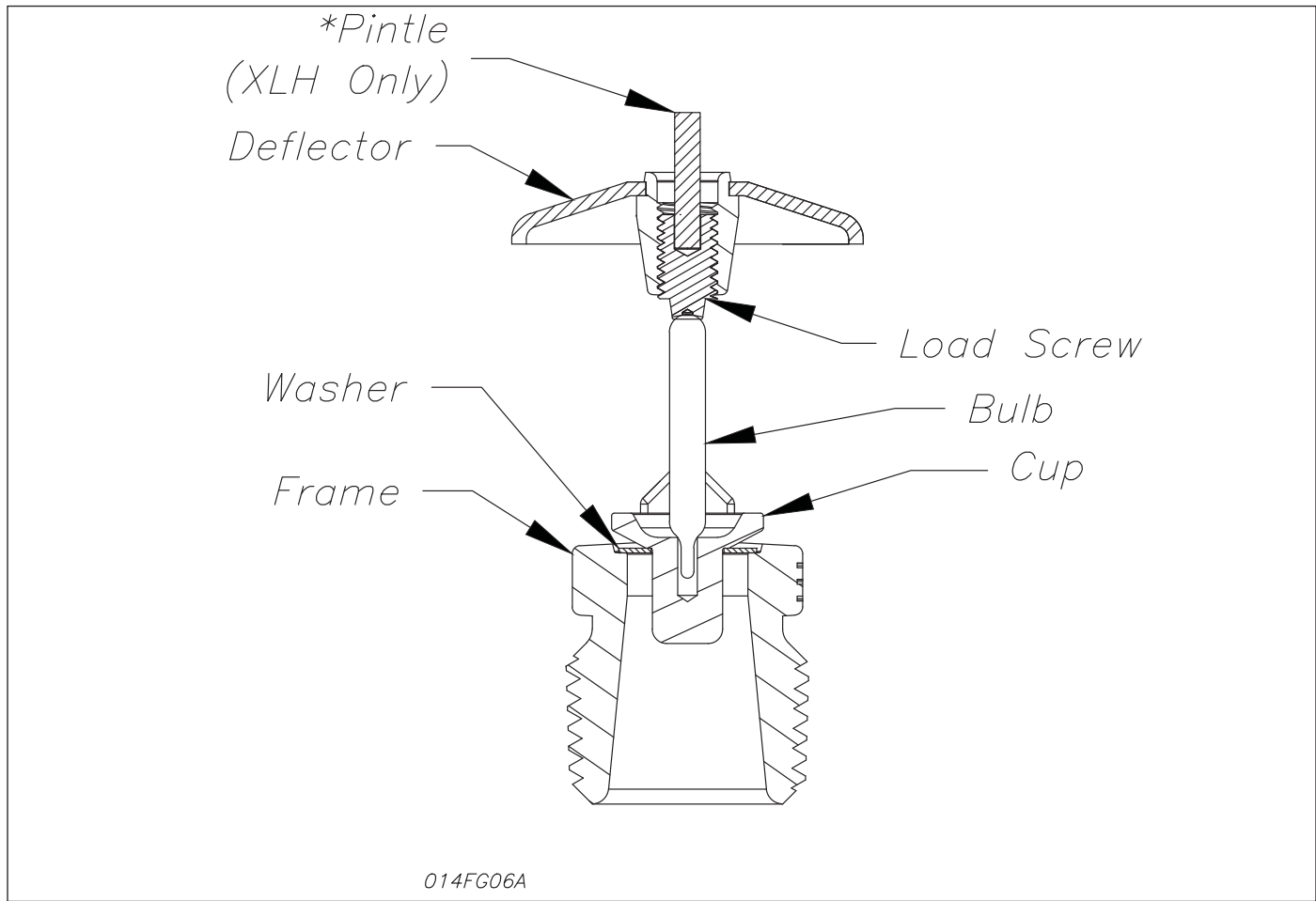
The glass bulb consists of an accurately controlled amount of special fluid hermetically sealed inside a precisely manufactured glass capsule. This glass bulb is specially constructed to provide fast thermal response.

At normal temperatures, the glass bulb contains the fluid in both the liquid and vapor phases. The vapor phase can be seen as a small bubble. As heat is applied, the liquid expands, forcing the bubble smaller and smaller as the liquid pressure increases. Continued heating forces the liquid to push out against the bulb, causing the glass to shatter, opening the waterway and allowing the deflector to distribute the discharging water.

XLH Recessed
Pendent FP

Application

Quick response sprinklers are used in fixed fire protection systems: Wet, Dry, Deluge or Preaction. Care must be exercised that the orifice size, temperature rating, deflector style and sprinkler type are in accordance with the latest published standards of the National Fire Protection Association or the approving Authority Having Jurisdiction. Quick response sprinklers are intended for installation as specified in NFPA 13. Quick response sprinklers and standard response sprinklers should not be intermixed.



Model F1FR42, F1FRXLH Upright

Technical data:

Models	Discharge Coefficient	Response	Thread Size	Max. Working Pressure	Min. Working Pressure	Temperature Rating	Finish
F1FR56 **F1FR56LL ⁽¹⁾	K 5.6	Quick Response	1/2" NPT (R1/2)	175 PSI	7 PSI	See "Temperature Ratings" Table.	See "Finish Table"
F1FR42 **F1FR42LL ⁽¹⁾ F1FRXLH	K 4.2						
F1FR28	K 2.8						

⁽¹⁾ Low Lead Sprinklers available only with Temperature Rating 200°F/93°C

Material Data:

Frame	Deflector	Load Screw	*Pintle	Cup	Washer	Bulb
DZR Brass QM Brass **Low Lead Brass	CDA Alloy 260, CDA Alloy 220 or CDA Alloy 510	CDA Alloy 360 or CDA Alloy 544	CDA Alloy 360 or CDA Alloy 544	CDA Alloy 651 or CDA Alloy 693	Nickel Alloy 440 or Alloy 360 coated with PTFE Adhesive Tape	Glass

Model F1FR56, Upright, Pendent & Conventional Sprinklers
Model F1FR42, F1FRXLH & F1FR28 Upright & Pendent Sprinklers

Installation Wrench: Model D Sprinkler Wrench

Installation Data:

Nominal Orifice	Thread	Nominal K Factor		Sprinkler	Approval	Sprinkler Identification Number (SIN)	
	Size	US	Metric	Height	Organization	Upright	Pendent
Standard-Upright (SSU) and Pendent Deflectors Marked to Indicate Position							
1/2" (15mm) ⁽¹⁾	1/2" NPT (R1/2)	5.6	80	2.25" (57mm)	1,2,3,4	RA1425 ⁽¹⁾⁽²⁾⁽³⁾	RA1414 ⁽¹⁾⁽²⁾⁽³⁾
7/16" (10mm)	1/2" NPT (R1/2)	4.2	60	2.25" (57mm)	1	RA1423 ⁽¹⁾	RA1413
3/8" (10mm)	1/2" NPT (R1/2)	2.8	40	2.25" (57mm)	1	RA1421 ⁽¹⁾	RA1411
Conventional-Install in Upright or Pendent Position							
15mm ⁽¹⁾	1/2" NPT (R1/2)	5.6	80	57mm	3, 4	RA1475 ⁽³⁾	

⁽¹⁾ cULus listed corrosion resistant (Polyester coated) sprinkler.

⁽²⁾ Polyester coated FM approved sprinkler.

⁽³⁾ Polyester coated LPCB & VdS approved sprinkler RA1425, RA1414 & RA1475.



Upright



Pendent



Conventional

Model F1FR56LL & F1FR42LL Pendent Sprinklers

Installation Wrench: Model D Sprinkler Wrench

Installation Data:

Nominal Orifice	Thread	Nominal K Factor		Sprinkler	Approval	Sprinkler Identification Number (SIN)
	Size	US	Metric	Height	Organization	Pendent
Standard-Pendent Deflectors Marked to Indicate Position						
1/2" (15mm) ⁽¹⁾	1/2" NPT (R1/2)	5.6	80	2.25" (57mm)	1,5	RA1414
7/16" (11mm)	1/2" NPT (R1/2)	4.2	60	2.25" (57mm)	1,5	RA1413

⁽¹⁾ cULus listed corrosion resistant (Polyester coated) sprinkler.



Model F1FR56, F1FR42, F1FRXLH & F1FR28 Quick Response Recessed Pendant Sprinkler⁽¹⁾

Installation Wrench: Model GFR2 Sprinkler Wrench

Installation Data:

Nominal Orifice	Thread Size	K Factor		Sprinkler Height	Sprinkler Identification Number (SIN)
		US	Metric		
1/2" (15mm)	1/2" NPT (R1/2)	5.6	80	2.25" (57mm)	RA1414
7/16" (10mm)	1/2" NPT (R1/2)	4.2	60	2.25" (57mm)	RA1413
3/8" (10mm)	1/2" NPT (R1/2)	2.8	40	2.25" (57mm)	RA1411

⁽¹⁾ Refer to escutcheon data table for approvals & dimensions

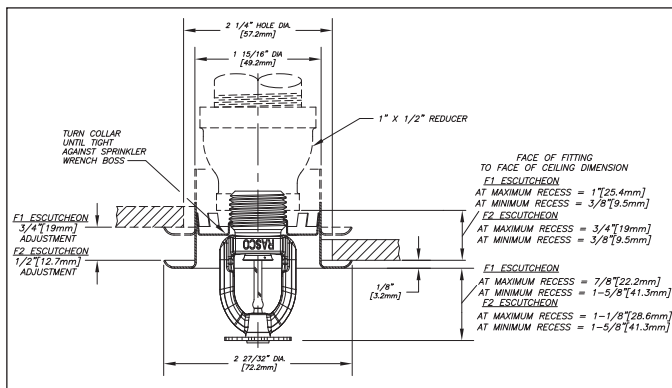
Model F1FR56LL & F1FR42LL Quick Response Recessed Pendant Sprinkler⁽¹⁾

Installation Wrench: Model GFR2 Sprinkler Wrench

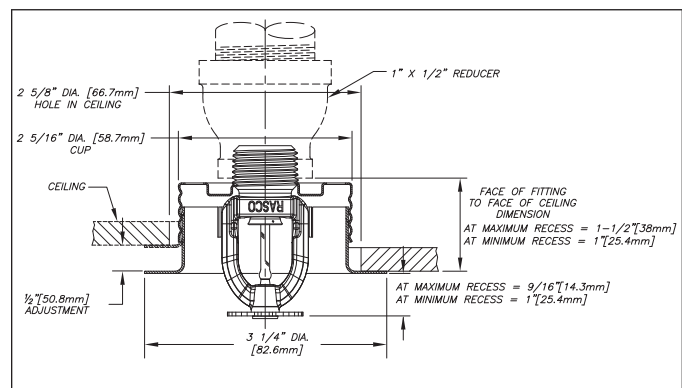
Installation Data:

Nominal Orifice	Thread Size	K Factor		Sprinkler Height	Sprinkler Identification Number (SIN)
		US	Metric		
1/2" (15mm)	1/2" NPT (R1/2)	5.6	80	2.25" (57mm)	RA1414
7/16" (10mm)	1/2" NPT (R1/2)	4.2	60	2.25" (57mm)	RA1413

⁽¹⁾ Refer to escutcheon data table for approvals & dimensions



Model F1FR56, F1FR56LL, F1FR42, F1FR42LL, F1FRXLH & F1FR28 F1 or F2



Model F1FR56, F1FR56LL, F1FR42, F1FR42LL, F1FRXLH & F1FR28 FP

Model F1FR56 Quick Response Vertical Sidewall Sprinkler

Installation Wrench: Model D Sprinkler Wrench

Installation Position: Upright or Pendant

Approval Type: Light Hazard Occupancy

Installation Data:

Nominal Orifice	Thread Size	Nominal K Factor		Sprinkler Height	Approval Organizations	Sprinkler Identification Numbers (SIN)
		US	Metric			
1/2" (15mm)	1/2" NPT (R1/2)	5.6	8.0	2.25" (57mm)	1,2,3,4	RA1485 ⁽²⁾
15mm	1/2" NPT (R1/2)	5.6	8.0	2.25" (57mm)	4 ⁽¹⁾	

⁽¹⁾ LPC Approval is for pendant position only.

⁽²⁾ cULus Listed corrosion resistant (Polyester coated) sprinkler.



Vertical Sidewall

Sprinkler Type	Deflector to Ceiling Distance (Min. - Max.)
Upright	4" (102mm) - 12" (305mm)
Pendant	4" (102mm) - 12" (305mm)

Model F1FR56 Quick Response Horizontal Sidewall Sprinkler

Deflector: HSW

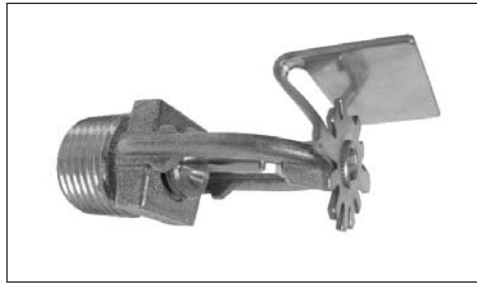
Installation Wrench: Model D Sprinkler Wrench

Installation Data: Horizontal Sidewall

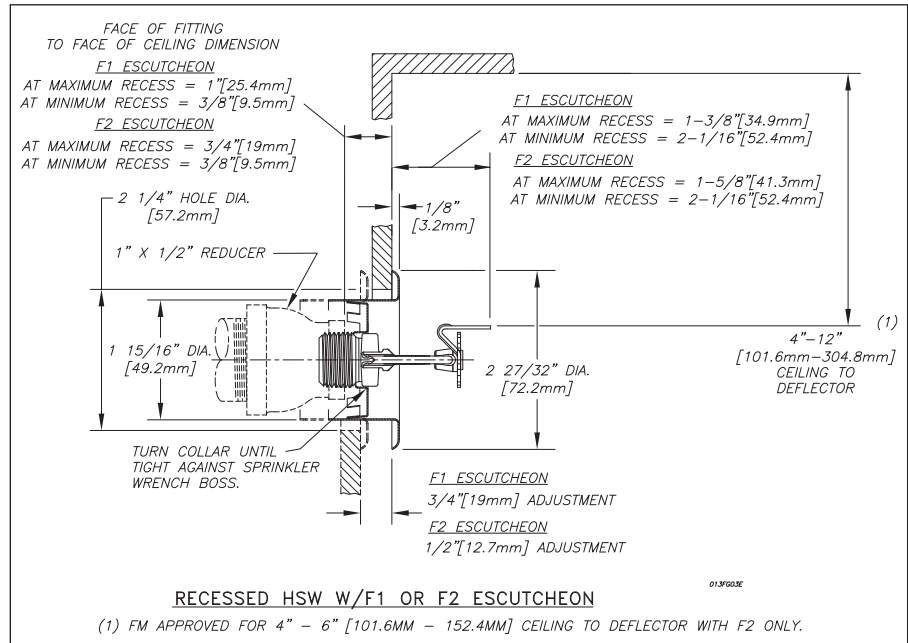
Nominal Orifice	Thread Size	Nominal K Factor		Sprinkler Height	Approval Organizations and Type of Approval		Sprinkler Identification Numbers (SIN)
		US	Metric		Light Hazard	Ordinary Hazard	
1/2" (15mm)	1/2" NPT (R1/2)	5.6	80	2.63" (67mm)	1,2	1	RA1435 ⁽¹⁾⁽²⁾

⁽¹⁾ cULus Listed corrosion resistant (Polyester coated) sprinkler.

⁽²⁾ Polyester coated FM approved sprinkler.



Horizontal Sidewall



Note: For Recessed HSW Sprinklers use installation wrench GFR2.

cULus permits use with F1, F2 or FP escutcheons for "Light Hazard" only. While FM limits use for the same hazard with the F2 escutcheon only.

Model F1FR56 Quick Response Concealed Pendent Sprinklers

Installation Wrench: Model RC1 Sprinkler Wrench

Technical Data:

Nominal Orifice	"K" Factor		Thread Size	Model	Temp. Rating		Max. Ambient Temp	Bulb Color	Approvals	Sprinkler Identification Number(SIN)
	US	Metric			Sprinkler	Cover				
1/2" (15mm)	5.6	80	1/2" NPT	F1FR	135°F/57°C	135°F/57°C	100°F/38°C	Orange	1	RA1414
1/2" (15mm)	5.6	80	1/2" NPT	F1FR	155°F/68°C	135°F/57°C	100°F/38°C	Red	1, 4 ⁽¹⁾	RA1414
1/2" (15mm)	5.6	80	1/2" NPT	F1FR	175°F/79°C	165°F/74°C	100°F/38°C	Yellow	1	RA1414
1/2" (15mm)	5.6	80	1/2" NPT	F1FR	200°F/93°C	165°F/74°C	150°F/65°C	Green	1	RA1414

⁽¹⁾ For VdS only = 155°F/68°C Norbulb and 1/2" [12.7mm] adjustment.

Model F1FR56LL Quick Response Concealed Pendent Sprinklers

Installation Wrench: Model RC1 Sprinkler Wrench

Technical Data:

Nominal Orifice	"K" Factor		Thread Size	Model	Temp. Rating		Max. Ambient Temp	Bulb Color	Approvals	Sprinkler Identification Number(SIN)
	US	Metric			Sprinkler	Cover				
1/2" (15mm)	5.6	80	1/2" NPT	F1FR56LL	200°F/93°C	165°F/74°C	150°F/65°C	Green	1, 5	RA1414

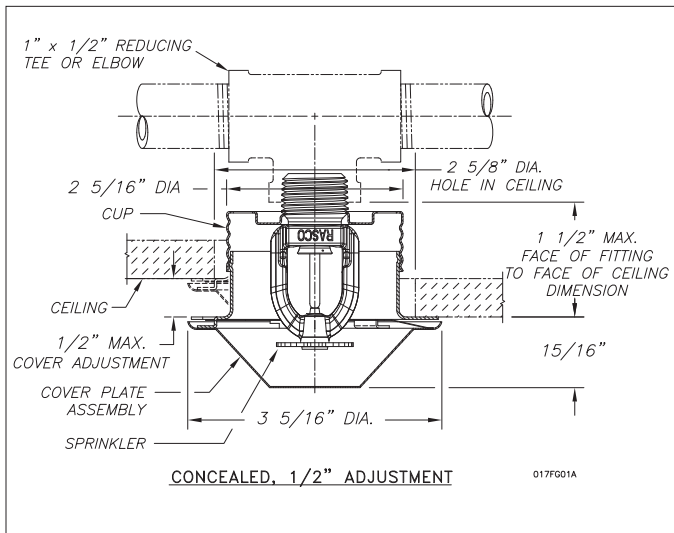


Figure 1

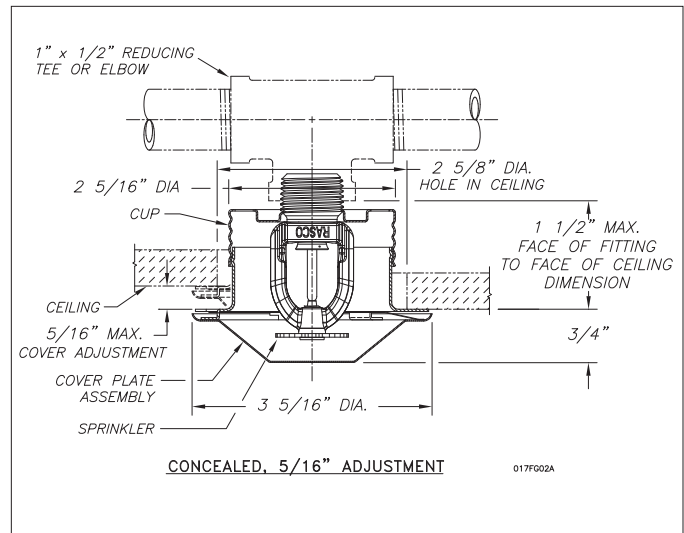


Figure 2

Installation Aid

A protective cap is included for use during installation.

Important: The F1FR56 Sprinkler with Model CCP cover plate is not an FM Approved combination.

Installation

Quick response sprinklers are intended for installation as specified in NFPA 13. Quick response sprinklers and standard response sprinklers should not be intermixed.

The Model F1FR56, F1FR56LL, F1FR42, F1FR42LL, F1FRXLH & F1FR28 Recessed Quick Response Sprinklers are to be installed as shown. The Model F1 or F2 Escutcheons illustrated are the only recessed escutcheons to be used with the Model F1FR56, F1FR56LL, F1FR42, F1FR42LL, F1FRXLH & F1FR28 Sprinklers. The use of any other recessed escutcheon will void all approvals and negate all warranties.

When installing Model F1FR56, F1FR56LL, F1FR42, F1FR42LL, F1FRXLH & F1FR28 Sprinklers, use the Model D Sprinkler Wrench. Use the Model GFR2 Wrench for installing F1FR56, F1FR56LL, F1FR42, F1FR42LL, F1FRXLH & F1FR28 Recessed Pendent Sprinklers. Any other type of wrench may damage these sprinklers.

NOTE: A leak tight 1/2" NPT (R1/2) sprinkler joint can be obtained with a torque of 8-18 ft-lbs (10,8 - 24,4 N-m). Do not tighten sprinklers over maximum recommended torque. It may cause leakage or impairment of the sprinklers.

The Models F1FR56/CCP & F1FR56LL/CCP Concealed Sprinkler use the 1/2" orifice, 1/2" NPT (R1/2), Model F1FR56 & F1FR56LL Pendent Sprinkler with a threaded Model CCP cup which is factory attached to the sprinklers. The Model F1FR56 Pndent is available in temperature rating of 135°F (57°C), 155°F (68°C), 175°F (79°C) or 200°F (93°C). The Model F1FR56LL Pendent is available only in a rating of 200°F (93°C). The concealed sprinkler assemblies are completed by the installation of the attractive low profile Model CCP push on cover plate assembly, rated 135°F (57°C) or 165°F (74°C) for the F1FR56 and 165°F (74°C) for the FIFR56 LL. The cover plate and sprinkler cup assemblies are joined using a cover plate skirt with flexible tabs for threaded en-

gagement. A choice of two cover plate assemblies provide either 1/2" (13mm) or 5/8" (8mm) of cover adjustment,

Do not install these sprinklers in ceiling which have positive pressure in the space above.

After a 2 5/8" (67mm) diameter hole is cut in the ceiling, the sprinkler is easily installed with the Model RC1 Wrench. A Teflon* based thread sealant should be applied to the sprinkler threads only. The Model RC1 Wrench is then used to engage the sprinkler wrenching surfaces and to install the sprinkler in the fitting. When inserting or removing the wrench from the sprinkler/cup assembly, care should be taken to prevent damage to the sprinkler. **DO NOT WRENCH ON ANY OTHER PART OF THE SPRINKLER.** The cover plate is then pushed onto the cup. Final adjustment is made by hand turning the cover plate until the skirt flange makes full contact with the ceiling. Cover plate removal requires turning in the counter clockwise direction.

After installation, inspect all sprinklers to ensure that there is a gap between the cover plate and ceiling and that the four cup slots are open and free from any air flow impediment to the space above.

Concealed cover plate/cup assemblies are listed only for use with specific sprinklers. The use of any other concealed cover plate/cup assembly with the Model F1FR56 Pendent Sprinkler or the use of the Model CCP Concealed cover plate assembly on any sprinkler with which it is not specifically listed may prevent good fire protection and will void all guarantees, warranties, listings and approvals.

Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling and installation. REMOVE THIS PROTECTION AT THE TIME THE SPRINKLER SYSTEM IS PLACED IN SERVICE FOR FIRE PROTECTION. Removal of the protectors before this time may leave the bulb vulnerable to damage. RASCO wrenches are designed to install sprinklers when covers are in place. REMOVE PROTECTORS BY UNDOING THE CLASP BY HAND. DO NOT USE TOOLS TO REMOVE THE PROTECTORS.

*DuPont Registered Trade Mark

Temperature Ratings

Classification	Sprinkler Temperature		Max. Ambient Temp.	Bulb Color
	°C	°F		
Ordinary	57	135	100°F (38°C)	Orange
Ordinary	68	155	100°F (38°C)	Red
Intermediate	79	175	150°F (66°C)	Yellow
Intermediate	93	200	150°F (66°C)	Green
High ⁽¹⁾	141	286	225°F (107°C)	Blue

⁽¹⁾ Not available for recessed sprinklers.

Escutcheon Data ⁽¹⁾

⁽¹⁾ SIN RA1435 – cULus permits use with F1, F2 or FP escutcheons for “light hazard” only, while FM limits use for same hazard with F2 escutcheon only.

Maintenance

The Model F1FR56, F1FR56LL, F1FR42, F1FR42LL, F1FRXLH and Model F1FR56, F1FR56LL, F1FR42, F1FR42LL, F1FRXLH & F1FR28 Recessed Sprinklers should be inspected and the sprinkler system maintained in accordance with NFPA 25. Do not clean sprinklers with soap and water, ammonia or any other cleaning fluids. Remove dust by using a soft brush or gentle vacuuming. Remove any sprinkler which has been painted (other than factory applied) or damaged in any way. A stock of spare sprinklers should be maintained to allow quick replacement of damaged or operated sprinklers. Prior to installation, sprinklers should be maintained in the original cartons and packaging to minimize the potential for damage to sprinklers that would cause improper operation or non-operation.

Sprinkler Types

Standard Upright
 Standard Pendent
 Conventional
 Recessed Pendent
 Vertical Sidewall
 Horizontal Sidewall
 Recessed Horizontal sidewall
 Concealed pendent

Maximum Working Pressure

175 psi (12 bar)
 100% Factory tested hydrostatically to 500 psi (34.5 bar)

Finishes ⁽¹⁾

Standard Finishes		
Sprinkler	Escutcheon	Cover plate ⁽¹⁾
Bronze	Brass	
Chrome Plated	Chrome	Chrome
Polyester	Plated	White
Coated ⁽⁴⁾⁽⁵⁾⁽⁶⁾	White Painted	
Special Application Finishes		
Sprinkler	Escutcheon	Cover plate ⁽¹⁾
Bright Brass ⁽³⁾	Bright Brass	Bright Brass
Black Plated	Black Plated	Satin
Black Paint ⁽²⁾⁽⁶⁾	Black Paint	Off White
Off White ⁽²⁾⁽⁶⁾	Off White	Black Paint
Satin Chrome	Satin Chrome	Black Plated

⁽¹⁾ Other finishes and colors are available on special order. Consult the factory for details. Custom color painted sprinklers may not retain their UL Corrosion resistance listing. Coverplate custom paint is semi-gloss, unless specified otherwise.

⁽²⁾ cULus Listed only.

⁽³⁾ 200°F (93°C) maximum.

⁽⁴⁾ cULus listed “corrosion resistance” applies to SIN Numbers RA1435 (HSW), RA1485(VSW), RA1425 (Upright), RA1414 (Pendent) and RA1415 (Pendent) in standard black or white. Corrosion resistance in other polyester colors is available upon request.

⁽⁵⁾ FM Approvals finish as “Polyester coated” applies to SIN Number RA1414, RA1435 and RA1425 in standard black or white.

⁽⁶⁾ LPCB and VdS Approved finish applies only to RA1425, RA1414 and RA1475.

Ordering Information

Specify:

1. Sprinkler Model
2. Sprinkler Type
3. Orifice Size
4. Deflector Type
5. Temperature Rating
6. Sprinkler Finish
7. Escutcheon Type
8. Escutcheon Finish (where applicable)
9. Cover plate Model
10. Cover plate Thread size
11. Cover plate Temperature
12. Cover plate Adjustment
13. Cover plate Finish

Note: When Model F1FR56 Recessed sprinklers are ordered, the sprinklers and escutcheons are packaged separately.

Reliable...For Complete Protection

Reliable offers a wide selection of sprinkler components. Following are some of the many precision-made Reliable products that guard life and property from fire around the clock.

- Automatic sprinklers
- Flush automatic sprinklers
- Recessed automatic sprinklers
- Concealed automatic sprinklers
- Adjustable automatic sprinklers
- Dry automatic sprinklers
- Intermediate level sprinklers
- Open sprinklers
- Spray nozzles
- Alarm valves
- Retarding chambers
- Dry pipe valves
- Accelerators for dry pipe valves
- Mechanical sprinkler alarms
- Electrical sprinkler alarm switches
- Water flow detectors
- Deluge valves
- Detector check valves
- Check valves
- Electrical system
- Sprinkler emergency cabinets
- Sprinkler wrenches
- Sprinkler escutcheons and guards
- Inspectors test connections
- Sight drains
- Ball drips and drum drips
- Control valve seals
- Air maintenance devices
- Air compressors
- Pressure gauges
- Identification signs
- Fire department connection

The equipment presented in this bulletin is to be installed in accordance with the latest published Standards of the National Fire Protection Association, Factory Mutual Research Corporation, or other similar organizations and also with the provisions of governmental codes or ordinances whenever applicable. Products manufactured and distributed by Reliable have been protecting life and property for over 90 years, and are installed and serviced by the most highly qualified and reputable sprinkler contractors located throughout the United States, Canada and foreign countries.

Manufactured by



The Reliable Automatic Sprinkler Co., Inc.
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(914) 829-2042 Corporate Offices
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