Fire Systems West, Inc.
206 FRONTAGE ROAD NORTH, SUITE C
PACIFIC, WA 98047
(253) 833-1248

FIRE SPRINKLER

Material Submittal

FOR

MultiCare Sport's Clinic
Puyallup, WA

FSW JOB NO. 2-11-12001

TABLE OF CONTENTS

Series TY-FRB — 2.8, 4.2, 5.6, and 8.0 K-Factor Upright, Pendent, and Recessed Pendent Sprinklers Quick Response, Standard Coverage

General Description

The TYCO Series TY-FRB, 2.8, 4.2, 5.6, and 8.0 K-factor, Upright, Pendent, and Recessed Pendent Sprinklers described in this data sheet are quick response, standard coverage, decorative 3 mm glass bulb-type spray sprinklers designed for use in light or ordinary hazard, commercial occupancies such as banks, hotels, and shopping malls.

The recessed version of the Series TY-FRB Pendent Sprinkler, where applicable, is intended for use in areas with a finished ceiling. This recessed pendent sprinkler uses one of the following:

- A two-piece Style 10 (1/2 inch NPT) or Style 40 (3/4 inch NPT) Recessed Escutcheon with 1/2 inch (12,7 mm) of recessed adjustment or up to 3/4 inch (19,1 mm) of total adjustment from the flush pendent position, or a
- A two-piece Style 20 (1/2 inch NPT) or Style 30 (3/4 inch NPT) Recessed Escutcheon with 1/4 inch (6,4 mm) of recessed adjustment or up to 1/2 inch (12,7 mm) of total adjustment from the flush pendent position.

The adjustment provided by the Recessed Escutcheon reduces the accuracy to which the fixed pipe drops to the sprinklers must be cut.

Corrosion-resistant coatings, where applicable, are utilized to extend the life of copper alloy sprinklers beyond that which would otherwise be obtained when exposed to corrosive atmospheres. Although corrosion-resistant coated sprinklers have passed the standard corrosion tests of the applicable approval agencies, the testing is not representative of all possible corrosive atmospheres. Consequently, it is recommended that the end user be consulted with respect to the suitability of these coatings for any given corrosive environment. The effects of ambient temperature, concentration of chemicals, and gas/chemical velocity, should be considered, as a minimum, along with the corrosive nature of the chemical to which the sprinklers will be exposed.

An intermediate level of the Series TY-FRB Pendent Sprinklers is detailed in Technical Data Sheet TFP356, and Sprinkler Guards are detailed in Technical Data Sheet TFP780.

NOTICE

The Series TY-FRB, 2.8, 4.2, 5.6, and 8.0 K-factor, Upright, Pendent, and Recessed Pendent Sprinklers described herein must be installed and maintained in compliance with this document and with the applicable standards of the National Fire Protection Association, in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

IMPORTANT

Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.

Sprinkler Identification Number (SIN)

TY1131 - Upright 2.8K, 1/2˝ NPT
TY1231 - Pendent 2.8K, 1/2˝ NPT
TY2131 - Upright 4.2K, 1/2˝ NPT
TY2231 - Pendent 4.2K, 1/2˝ NPT
TY3131 - Upright 5.6K, 1/2˝ NPT
TY3231 - Pendent 5.6K, 1/2˝ NPT
TY4131 - Upright 8.0K, 3/4˝ NPT
TY4231 - Pendent 8.0K, 3/4˝ NPT
TY4831 - Upright 8.0K, 1/2˝ NPT
TY4931 - Pendent 8.0K, 1/2˝ NPT

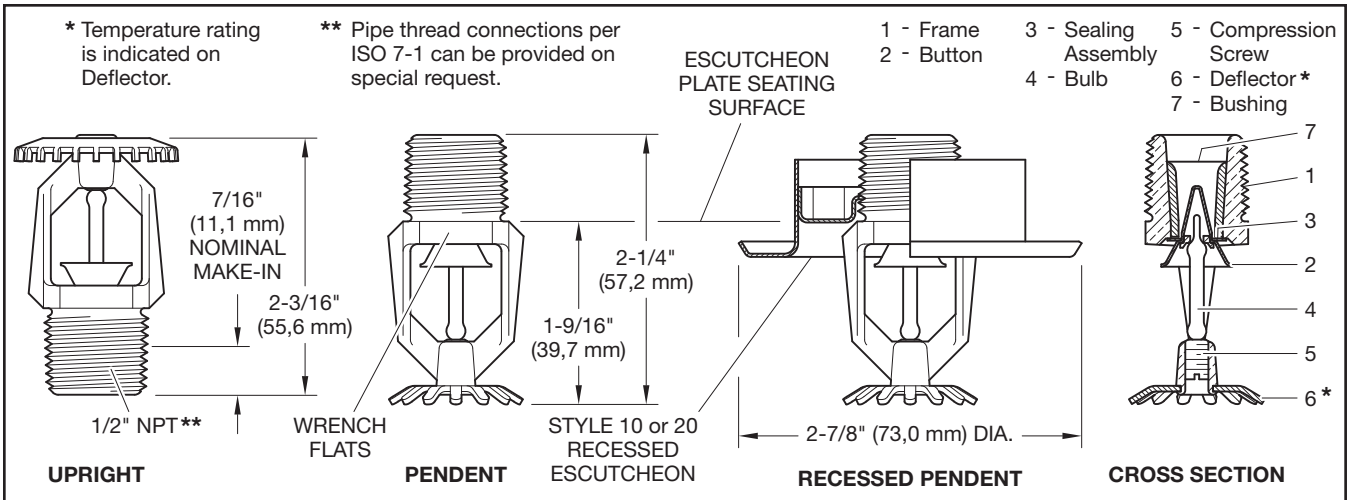


FIGURE 1
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY1131) AND PENDENT (TY1231) SPRINKLERS
2.8 K-FACTOR, 1/2 INCH NPT

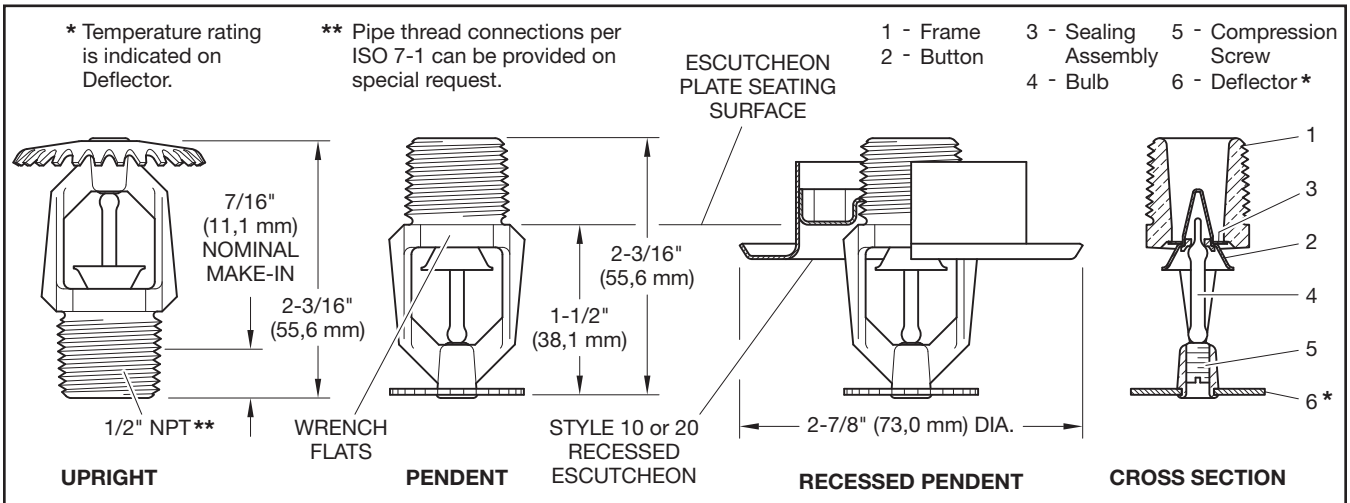


FIGURE 2
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY2131) AND PENDENT (TY2231) SPRINKLERS
4.2 K-FACTOR, 1/2 INCH NPT

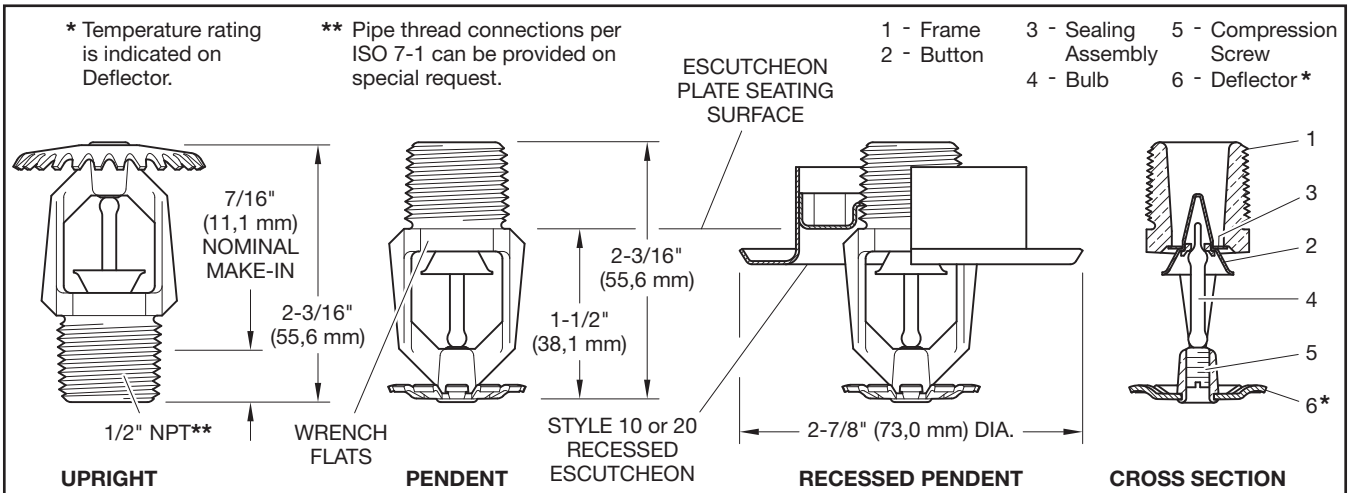


FIGURE 3
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY3131) AND PENDENT (TY3231) SPRINKLERS
5.6 K-FACTOR, 1/2 INCH NPT

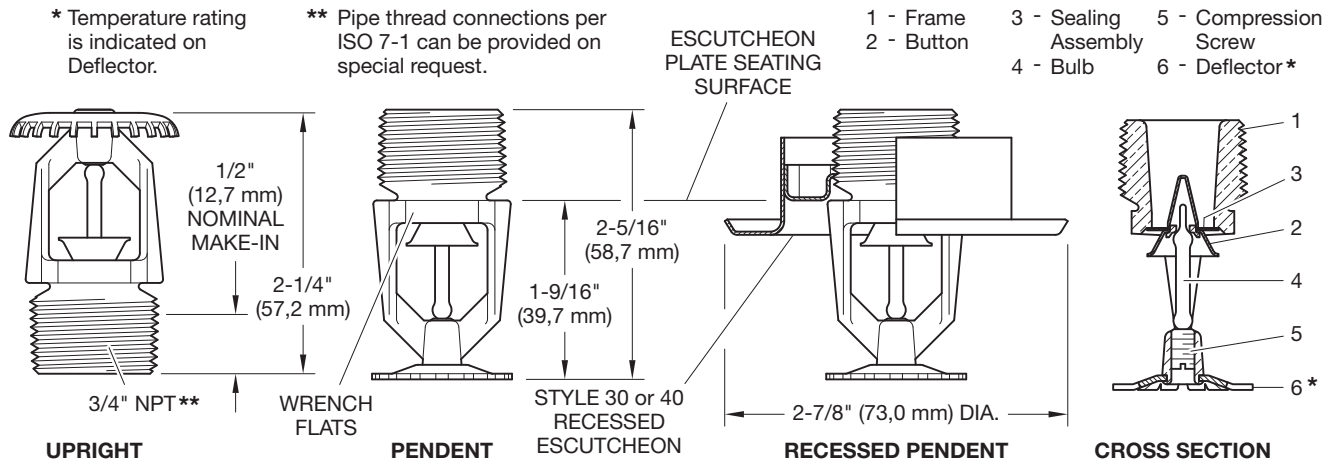


FIGURE 4
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY4131) AND PENDENT (TY4231) SPRINKLERS
8.0 K-FACTOR, 3/4 INCH NPT

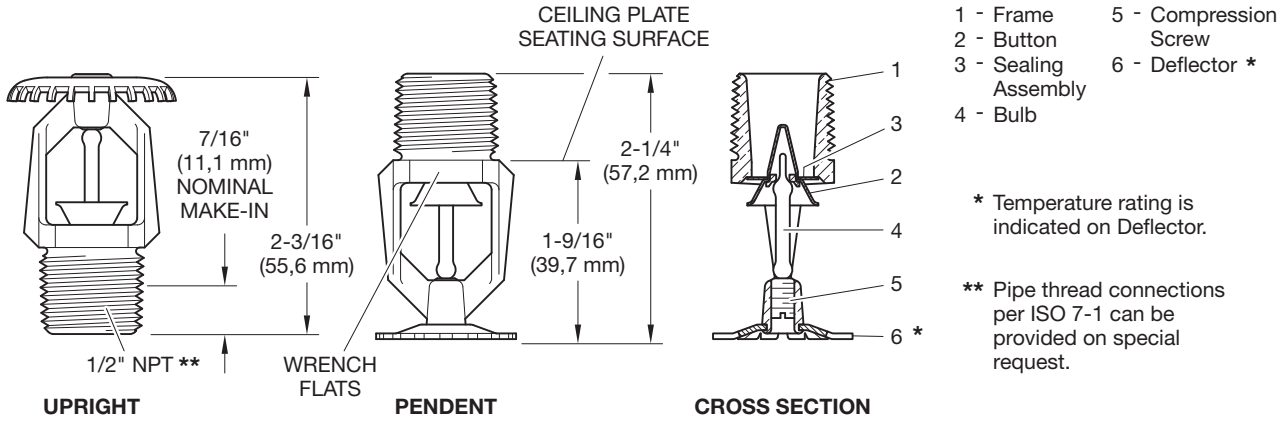


FIGURE 5
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY4831) AND PENDENT (TY4931) SPRINKLERS
8.0 K-FACTOR, 1/2 INCH NPT

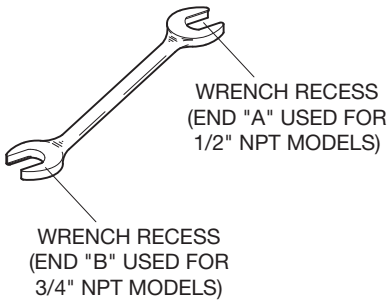


FIGURE 6
W-TYPE 6 SPRINKLER WRENCH

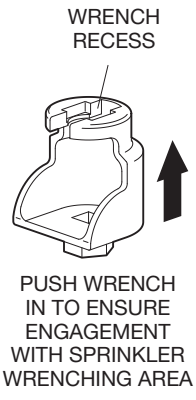


FIGURE 7
W-TYPE 7 RECESSED SPRINKLER WRENCH

Technical Data

Approvals
UL and C-UL Listed
FM, LPCB, and NYC Approved
Refer to Table A and B for complete approval information including corrosion-resistant status.

Maximum Working Pressure
Refer to Table C.

Discharge Coefficient
K=2.8 gpm/psi½ (40,3 lpm/bar½)
K=4.2 gpm/psi½ (60,5 lpm/bar½)
K=5.6 gpm/psi½ (80,6 lpm/bar½)
K=8.0 gpm/psi½ (115,2 lpm/bar½)

Temperature Rating
Refer to Table A and B.

Finishes
Sprinkler: Refer to Table D.

Recessed Escutcheon: Signal or Pure White, Jet Black, Chrome Plated, or Natural Brass

Physical Characteristics

Frame	Bronze
Button	Brass/Copper
Sealing Assembly	Beryllium Nickel w/TEFLON
Bulb	Glass
Compression Screw	Bronze
Deflector	Copper/Bronze
Bushing (K=2.8)	Bronze

Operation

The glass bulb contains a fluid that expands when exposed to heat. When the rated temperature is reached, the fluid expands sufficiently to shatter the glass bulb, allowing the sprinkler to activate and water to flow.

Design Criteria

The TYCO Series TY-FRB, 2.8, 4.2, 5.6, and 8.0 K-factor, Upright, Pendent, and Recessed Pendent Sprinklers are intended for fire protection systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency (such as, UL Listing is based on the requirements of NFPA 13, and FM Approval is based on the requirements of FM's Loss Prevention Data Sheets). Only the Style 10, 20, 30, or 40 Recessed Escutcheon, as applicable, is to be used for recessed pendent installations.

Installation

The TYCO Series TY-FRB, 2.8, 4.2, 5.6, and 8.0 K-factor, Upright, Pendent, and Recessed Pendent Sprinklers must be installed in accordance with this section.

General Instructions
Do not install any bulb-type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 inch (1,6 mm) for the 135°F (57°C) and 3/32 inch (2,4 mm) for the 286°F (141°C) temperature ratings.

A leak-tight 1/2 inch NPT sprinkler joint should be obtained by applying a minimum to maximum torque of 7 to 14 ft.-lbs. (9,5 to 19,0 Nm). A leak tight 3/4 inch NPT sprinkler joint should be obtained with a torque of 10 to 20 ft.-lbs. (13,4 to 26,8 Nm). Higher levels of torque can distort the sprinkler Inlet with consequent leakage or impairment of the sprinkler.

Do not attempt to compensate for insufficient adjustment in the Escutcheon Plate by under- or over-tightening the sprinkler. Re-adjust the position of the sprinkler fitting to suit.

Series TY-FRB Upright and Pendent Sprinklers
The Series TY-FRB Pendent and Upright Sprinklers must be installed in accordance with the following instructions.

Step 1. Install Pendent sprinklers in the pendent position. Install upright sprinklers in the upright position.

Step 2. With pipe-thread sealant applied to the pipe threads, hand-tighten the sprinkler into the sprinkler fitting.

Step 3. Tighten the sprinkler into the sprinkler fitting using only the W-Type 6 Sprinkler Wrench (Figure 6). With reference to Figures 1 through 5, apply the W-Type 6 Sprinkler Wrench to the sprinkler wrench flats.

Series TY-FRB Recessed Pendent Sprinklers
The Series TY-FRB Recessed Pendent Sprinklers must be installed in accordance with the following instructions.

Step A. After installing the Style 10, 20, 30, or 40 Mounting Plate, as applicable, over the sprinkler threads and with pipe-thread sealant applied to the pipe threads, hand-tighten the sprinkler into the sprinkler fitting.

Step B. Tighten the sprinkler into the sprinkler fitting using only the W-Type 7 Recessed Sprinkler Wrench (Figure 7). With reference to Figures 1 to 4, apply the W-Type 7 Recessed Sprinkler Wrench to the sprinkler wrench flats.

Step C. After ceiling installation and finishing, slide on the Style 10, 20, 30, or 40 Closure over the Series TY-FRB Sprinkler and push the Closure over the Mounting Plate until its flange comes in contact with the ceiling.

K FACTOR	TYPE	TEMPERATURE	SPRINKLER FINISH (See Note 5)			
			BULB LIQUID COLOR	NATURAL BRASS	CHROME PLATED	POLYESTER***
2.8 1/2" NPT	PENDENT (TY1231) and UPRIGHT (TY1131)	135°F (57°C)	Orange	1, 2, 3, 4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
		286°F (141°C)	Blue			
	RECESSED PENDENT (TY1231)* Figure 8	135°F (57°C)	Orange	1, 2, 4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
	RECESSED PENDENT (TY1231)** Figure 9	135°F (57°C)	Orange			
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
4.2 1/2" NPT	PENDENT (TY2231) and UPRIGHT (TY2131)	135°F (57°C)	Orange	1, 2		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
		286°F (141°C)	Blue			
	RECESSED PENDENT (TY2231)* Figure 10	135°F (57°C)	Orange			
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
	RECESSED PENDENT (TY2231)** Figure 11	135°F (57°C)	Orange			
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			

NOTES:
1. Listed by Underwriters Laboratories, Inc., (UL) as Quick Response Sprinklers.
2. Listed by Underwriters Laboratories, Inc., for use in Canada (C-UL) as Quick Response Sprinklers.
3. Approved by Factory Mutual Research Corporation (FM) as Quick Response Sprinklers.
4. Approved by the City of New York under MEA 354-01-E.
5. Where Polyester Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed as Corrosion-Resistant Sprinklers.

* Installed with Style 10 (1/2" NPT) or Style 40 (3/4" NPT) 3/4" Total Adjustment Recessed Escutcheon, as applicable.
** Installed with Style 20 (1/2" NPT) or Style 30 (3/4" NPT) 1/2" Total Adjustment Recessed Escutcheon, as applicable.
*** Frame and Deflector only.
N/A: Not Available

TABLE A
LABORATORY LISTINGS AND APPROVALS FOR
2.8 AND 4.2 K-FACTOR SPRINKLERS

K FACTOR	TYPE	TEMPERATURE	SPRINKLER FINISH (See Note 8)				
			BULB LIQUID COLOR	NATURAL BRASS	CHROME PLATED	POLYESTER***	LEAD COATED
5.6 1/2" NPT	PENDENT (TY3231) and UPRIGHT (TY3131)	135°F (57°C)	Orange	1, 2, 3, 4, 5, 6, 7			1, 2, 3, 5
		155°F (68°C)	Red				
		175°F (79°C)	Yellow				
		200°F (93°C)	Green				
		286°F (141°C)	Blue				
	RECESSED PENDENT (TY3231)* Figure 12	135°F (57°C)	Orange	1, 2, 4, 5			N/A
		155°F (68°C)	Red				
		175°F (79°C)	Yellow				
		200°F (93°C)	Green				
		286°F (141°C)	Blue				
	RECESSED PENDENT (TY3231)** Figure 13	135°F (57°C)	Orange	1, 2, 3, 4, 5			N/A
		155°F (68°C)	Red				
		175°F (79°C)	Yellow				
		200°F (93°C)	Green				
		286°F (141°C)	Blue				
8.0 3/4" NPT	PENDENT (TY4231) and UPRIGHT (TY4131)	135°F (57°C)	Orange	1, 2, 3, 4, 5, 6, 7			1, 2, 5
		155°F (68°C)	Red				
		175°F (79°C)	Yellow				
		200°F (93°C)	Green				
		286°F (141°C)	Blue				
	RECESSED PENDENT (TY4231)* Figure 14	135°F (57°C)	Orange	1, 2, 5			N/A
		155°F (68°C)	Red				
		175°F (79°C)	Yellow				
		200°F (93°C)	Green				
		286°F (141°C)	Blue				
	RECESSED PENDENT (TY4231)** Figure 15	135°F (57°C)	Orange	1, 2, 3, 5			N/A
		155°F (68°C)	Red				
		175°F (79°C)	Yellow				
		200°F (93°C)	Green				
		286°F (141°C)	Blue				
8.0 1/2" NPT	PENDENT (TY4931) and UPRIGHT (TY4831)	135°F (57°C)	Orange	1, 2, 4, 5, 6			1, 2, 5
		155°F (68°C)	Red				
		175°F (79°C)	Yellow				
		200°F (93°C)	Green				
		286°F (141°C)	Blue				

NOTES:
1. Listed by Underwriters Laboratories, Inc., (UL) as Quick Response Sprinklers.
2. Listed by Underwriters Laboratories, Inc., for use in Canada (C-UL) as Quick Response Sprinklers.
3. Approved by Factory Mutual Research Corporation (FM) as Quick Response Sprinklers.
4. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 007k/04) as Quick Response Sprinklers. However, LPCB does not rate the thermal sensitivity of recessed sprinklers.
5. Approved by the City of New York under MEA 354-01-E.
6. VdS Approved (For details, contact Tyco Fire Suppression & Building Products, Enschede, Netherlands, Tel. 31-53-428-4444/Fax 31-53-428-3377.)
7. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 094a/06) as Quick Response Sprinklers.
8. Where Polyester Coated and Lead-Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed as Corrosion-Resistant Sprinklers. Where Lead-Coated Sprinklers are noted to be FM Approved, the sprinklers are FM Approved as a Corrosion-Resistant Sprinklers.

* Installed with Style 10 (1/2" NPT) or Style 40 (3/4" NPT) 3/4" Total Adjustment Recessed Escutcheon, as applicable.
** Installed with Style 20 (1/2" NPT) or Style 30 (3/4" NPT) 1/2" Total Adjustment Recessed Escutcheon, as applicable.
*** Frame and Deflector only.
N/A: Not Available

TABLE B
LABORATORY LISTINGS AND APPROVALS FOR
5.6 AND 8.0 K-FACTOR SPRINKLERS

K FACTOR	TYPE	SPRINKLER FINISH			
		NATURAL BRASS	CHROME PLATED	POLYESTER	LEAD COATED
2.8 1/2" NPT	PENDENT (TY1231) and UPRIGHT (TY1131)	175 PSI (12,1 BAR)			N/A
	RECESSED PENDENT (TY1231)				
4.2 1/2" NPT	PENDENT (TY2231) and UPRIGHT (TY2131)	175 PSI (12,1 BAR)			N/A
	RECESSED PENDENT (TY2231)				
5.6 1/2" NPT	PENDENT (TY3231) and UPRIGHT (TY3131)	250 PSI (17,2 BAR) OR 175 PSI (12,1 BAR) (SEE NOTE 1)			
	RECESSED PENDENT (TY3231)				
8.0 3/4" NPT	PENDENT (TY4231) and UPRIGHT (TY4131)	175 PSI (12,1 BAR)			175 PSI (12,1 BAR)
	RECESSED PENDENT (TY4231)				N/A
8.0 1/2" NPT	PENDENT (TY4931) and UPRIGHT (TY4831)	175 PSI (12,1 BAR)			175 PSI (12,1 BAR)

NOTES:
1. The maximum working pressure of 250 psi (17,2 bar) only applies to the Listing by Underwriters Laboratories Inc. (UL); the Listing by Underwriters Laboratories, Inc. for use in Canada (C-UL); and, the Approval by the City of New York.

TABLE C
MAXIMUM WORKING PRESSURE

Care and Maintenance

The TYCO Series TY-FRB must be maintained and serviced in accordance with this section.

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, obtain permission to shut down the affected fire protection systems from the proper authorities and notify all personnel who may be affected by this action.

Absence of the outer piece of an escutcheon, which is used to cover a clearance hole, can delay sprinkler operation in a fire situation.

Sprinklers which are found to be leaking or exhibiting visible signs of corrosion must be replaced.

Automatic sprinklers must never be painted, plated, coated, or otherwise altered after leaving the factory. Modified sprinklers must be replaced. Sprinklers that have been exposed to corrosive products of combustion, but have not operated, should be replaced if they cannot be completely cleaned by wiping the sprinkler with a cloth or by brushing it with a soft bristle brush.

Care must be exercised to avoid damage to the sprinklers before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb. (Ref. Installation Section.)

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any other authorities having jurisdiction. Contact the installing contractor or sprinkler manufacturer regarding any questions.

Automatic sprinkler systems are recommended to be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

Care must be exercised to avoid damage to the sprinklers -before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb. (Ref. Installation Section).

Initial and frequent visual inspections of random samples are recommended for corrosion-resistant sprinklers to verify the integrity of the corrosion-resistant material of construction. Thereafter, annual inspections per NFPA 25 should suffice.

Inspections of corrosion-resistant sprinklers are recommended at close range, instead of from the floor level per NFPA. Inspection at close range can better determine the exact sprinkler condition and the long-term integrity of the corrosion-resistant material, which can be affected by the corrosive conditions present.

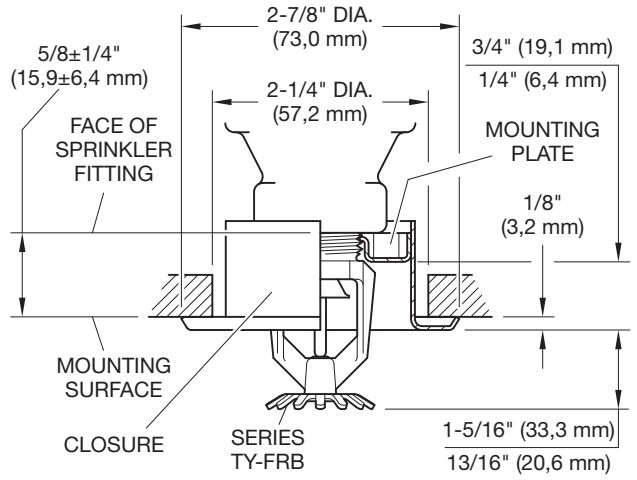


FIGURE 8
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
2.8 K-FACTOR, 1/2 INCH NPT

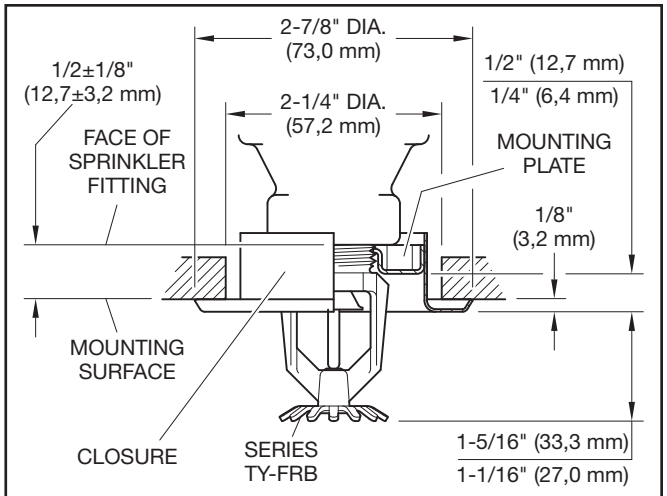


FIGURE 9
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
2.8 K-FACTOR, 1/2 INCH NPT

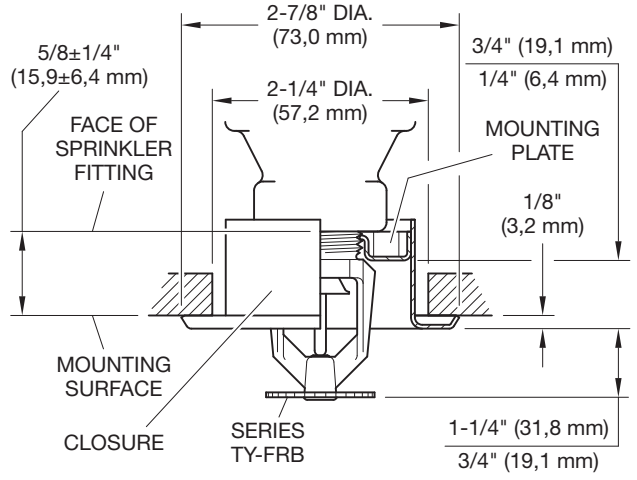


FIGURE 10
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
4.2 K-FACTOR, 1/2 INCH NPT

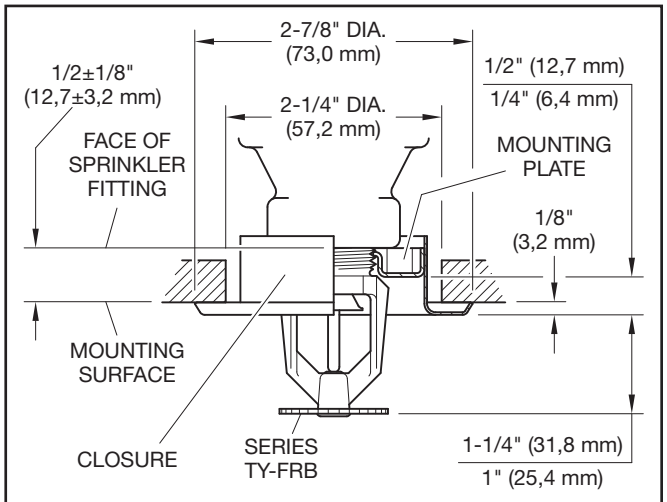


FIGURE 11
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
4.2 K-FACTOR, 1/2 INCH NPT

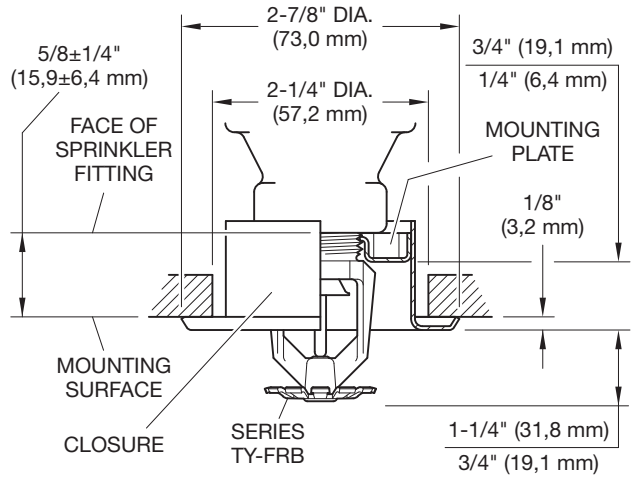


FIGURE 12
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
5.6 K-FACTOR, 1/2 INCH NPT

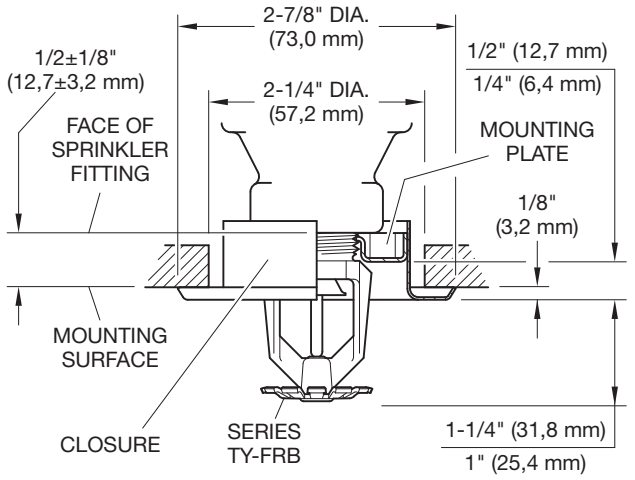


FIGURE 13
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
5.6 K-FACTOR, 1/2 INCH NPT

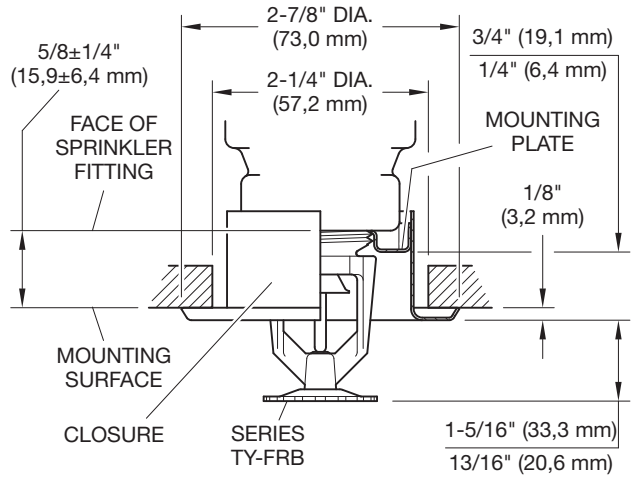


FIGURE 14
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 40 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 INCH NPT

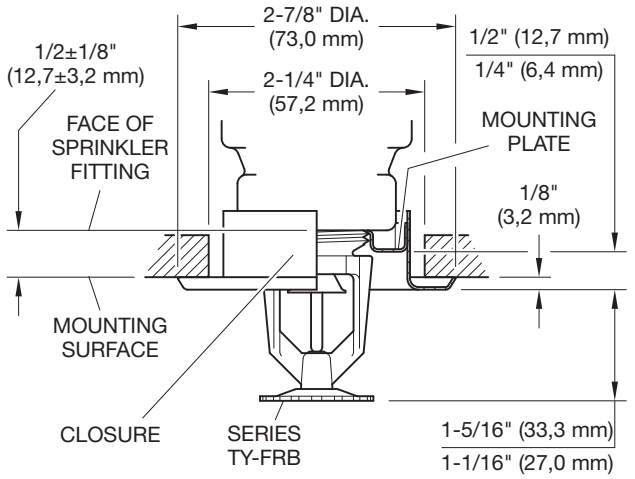


FIGURE 15
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 30 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 INCH NPT

P/N 57 – XXX – X – XXX

		SIN
330	2.8K UPRIGHT (1/2”NPT)	TY1131
331	2.8K PENDENT (1/2”NPT)	TY1231
340	4.2K UPRIGHT (1/2”NPT)	TY2131
341	4.2K PENDENT (1/2”NPT)	TY2231
370	5.6K UPRIGHT (1/2”NPT)	TY3131
371	5.6K PENDENT (1/2”NPT)	TY3231
390	8.0K UPRIGHT (3/4”NPT)	TY4131
391	8.0K PENDENT (3/4”NPT)	TY4231
360	8.0K UPRIGHT (1/2”NPT)	TY4831*
361	8.0K PENDENT (1/2”NPT)	TY4931*

	SPRINKLER FINISH
1	NATURAL BRASS
3	PURE WHITE POLYESTER (RAL9010)[1]
4	SIGNAL WHITE POLYESTER (RAL9003)
5	JET BLACK POLYESTER (RAL9005)[2]
7	LEAD COATED
9	CHROME PLATED

	TEMPERATURE RATINGS
135	135°F (57°C)
155	155°F (68°C)
175	175°F (79°C)
200	200°F (93°C)
286	286°F (141°C)

NOTES:
1. Eastern Hemisphere sales only.
2. Available in only 2.8K, 4.2K, and 8.0K, 155°F (68°C) and 200°F (93°C); requires lead time to manufacture.

TABLE D
SERIES TY-FRB PENDENT AND UPRIGHT SPRINKLERS
PART NUMBER SELECTION

Limited Warranty

For warranty terms and conditions, visit www.tyco-fire.com.

Ordering Procedure

Contact your local distributor for availability. When placing an order, indicate the full product name and Part Number (P/N).

Sprinkler Assemblies with NPT Thread Connections
Specify: Series TY-FRB (Specify SIN), (specify K-factor), (specify Pendent or Upright) Sprinkler (specify) temperature rating, (specify) finish or coating, P/N (specify from Table D)

Recessed Escutcheon
Specify: Style (10, 20, 30, or 40) Recessed Escutcheon with (specify*) finish, P/N (specify*)

Sprinkler Wrench
Specify: W-Type 6 Sprinkler Wrench, P/N 56-000-6-387

Specify: W-Type 7 Sprinkler Wrench, P/N 56-850-4-001

* Refer to Technical Data Sheet TFP770

tyco Fire Protection Products

FlexHead commercial fire sprinkler connections

FLEXHEAD® INDUSTRIES

The best idea in sprinkler systems since water

Submittal Package

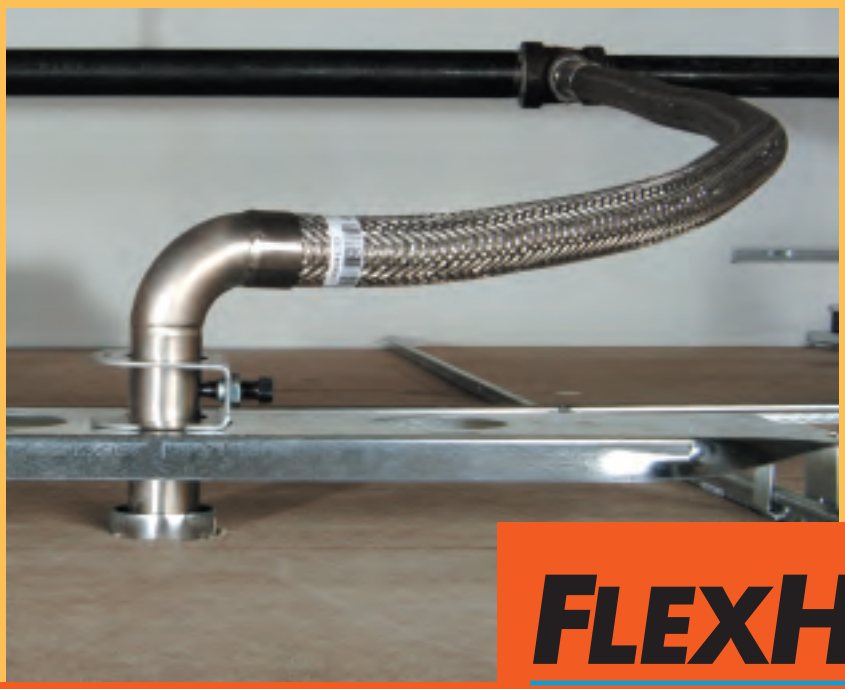
FM APPROVED

c UL us LISTED

SYSTEM COMPATIBLE

N.Y.C. MEA #261-99-E

CA: OPA-0672



FLEXHEAD®
INDUSTRIES

The best idea in sprinkler systems since water

Index

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."**

Installation Instructions (dated 8/20/08)

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 taping 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.** 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.

NFPA 13 Code Language and Seismic Qualification

NFPA 13 Standard for Installation of Sprinkler Systems 2007 Edition

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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.

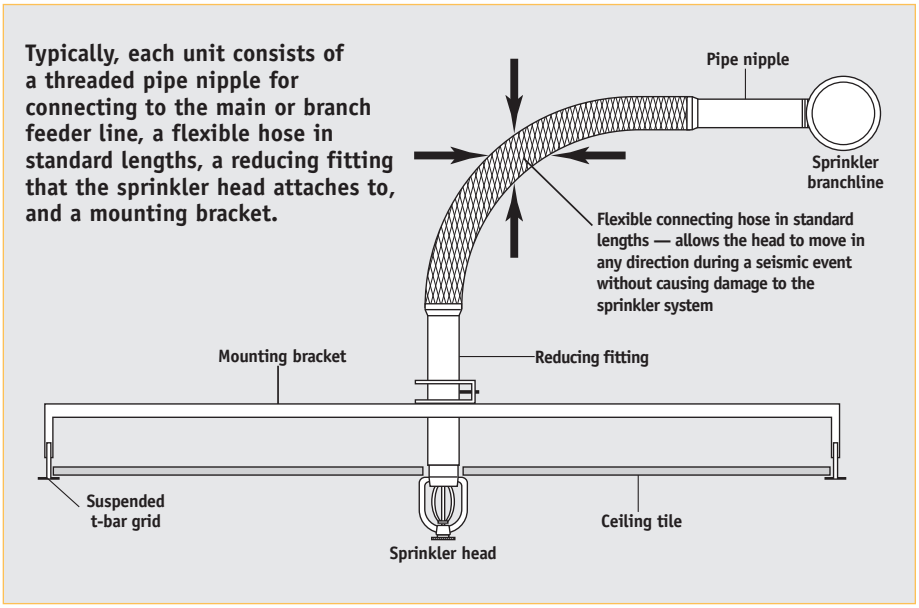
9.2.1.3.3.2 When installed and supported by suspended ceilings, the ceiling shall meet ASTM C-635and shall be installed in accordance with ASTM C-636.

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® Flexible Sprinkler Connections Satisfy New Seismic Code Requirements

Background of New Code Requirements: 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 code is intended to neutralize the probability of fire sprinkler systems being damaged and made inoperable by seismic activity, including ceiling movement than can shear sprinkler heads and/or disrupt the integrity of arm-over connections from the branch lines.



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.

The IBC Code and Sprinkler Design in Suspended Ceilings: The latest version of the IBC defers to ASCE 7 for the sprinkler/ceiling design in Seismic Design Categories 9SDC) 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 Connections Exceed IBC Code Requirements: 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". This is the first time a sprinkler component has been seismically certified using test criteria accepted by the IBC.** FlexHeads were installed in suspended ceilings meeting the code requirements for Seismic Design Category C and Seismic Design Categories D, E & F and were subjected to the highest accelerations determined for each Seismic Design Category. No damage to the fire sprinkler system or suspended ceiling system was observed, and the sprinkler heads remained in their intended location during all of the test performed.

Friction Loss Data and Specifications

FRICTION LOSS

FlexHead Model #	Outlet Size in(cm)	Hose Assembly Length ft(m)	Maximum Number of 90-Degree Bends (3 in. Bending Radius)	FM/UL Maximum Equivalent Length Length of Schedule 40, Nominal 1 in. Diameter Pipe, ft FM/UL	Maximum Ambient Temperature Rating F(C)	Maximum Rated Pressure H-Series psi (kPa)/psi (kPa)
2024, 2024H	1/2(1.27)	2(0.6)	3	3.5/11	300°(148°)	175(1205)/300(2068)
2036, 2036H	1/2(1.27)	3(0.9)	3	4.8/16	300°(148°)	175(1205)/300(2068)
2048, 2048H	1/2(1.27)	4(1.2)	4	6.8/24	300°(148°)	175(1205)/300(2068)
2060, 2060H	1/2(1.27)	5(1.5)	4	8.5/29	300°(148°)	175(1205)/300(2068)
2072, 2072H	1/2(1.27)	6(1.8)	4	8.9/35	300°(148°)	175(1205)/300(2068)
2024, 2024H	3/4(1.90)	2(0.6)	3	7.8/12	300°(148°)	175(1205)/300(2068)
2036, 2036H	3/4(1.90)	3(0.9)	3	8.1/18	300°(148°)	175(1205)/300(2068)
2048, 2048H	3/4(1.90)	4(1.2)	4	17.9/23	300°(148°)	175(1205)/300(2068)
2060, 2060H	3/4(1.90)	5(1.5)	4	19.9/29	300°(148°)	175(1205)/300(2068)
2072, 2072H	3/4(1.90)	6(1.8)	4	24.3/32	300°(148°)	175(1205)/300(2068)
2024E, 2024HE	1/2(1.27)	2(0.6)	3	5.5/19	300°(148°)	175(1205)/300(2068)
2036E, 2036HE	1/2(1.27)	3(0.9)	3	6.8/23	300°(148°)	175(1205)/300(2068)
2048E, 2048HE	1/2(1.27)	4(1.2)	4	8.8/27	300°(148°)	175(1205)/300(2068)
2060E, 2060HE	1/2(1.27)	5(1.5)	4	10.5/32	300°(148°)	175(1205)/300(2068)
2072E, 2072HE	1/2(1.27)	6(1.8)	4	10.9/35	300°(148°)	175(1205)/300(2068)
2024E, 2024HE	3/4(1.90)	2(0.6)	3	9.8/18	300°(148°)	175(1205)/300(2068)
2036E, 2036HE	3/4(1.90)	3(0.9)	3	10.1/23	300°(148°)	175(1205)/300(2068)
2048E, 2048HE	3/4(1.90)	4(1.2)	4	19.9/23	300°(148°)	175(1205)/300(2068)
2060E, 2060HE	3/4(1.90)	5(1.5)	4	21.9/29	300°(148°)	175(1205)/300(2068)
2072E, 2072HE	3/4(1.90)	6(1.8)	4	26.3/32	300°(148°)	175(1205)/300(2068)

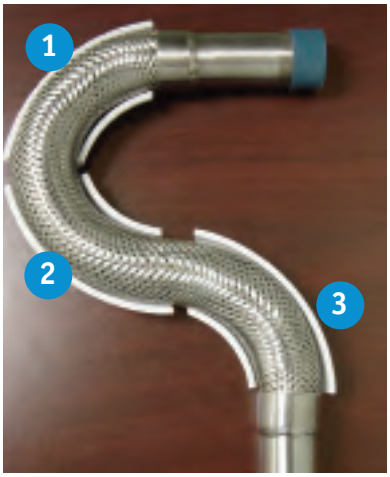
Model Numbers: The "H" designates high pressure unit rated to 300 psig and the "E" designates elbow style unit.

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 7" minimum bend radius per FM guidelines.*

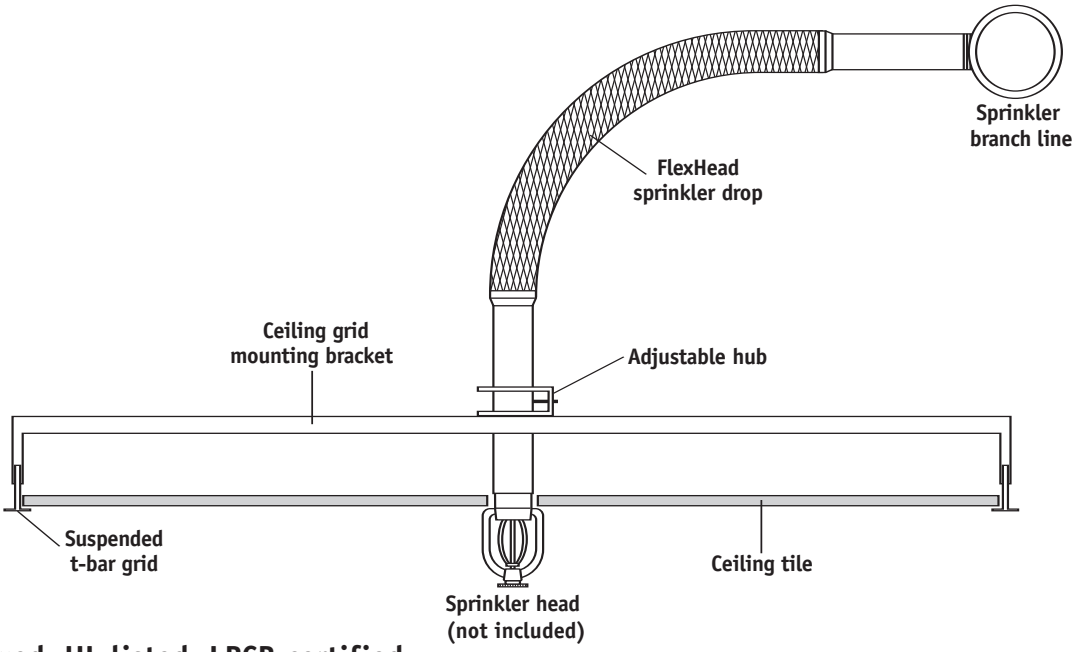
* **Equivalent lengths are shown with maximum number of 90 degree bends at the minimum bend-radius. Different values were obtained by FM and UL due to the differences in minimum bend radius, testing protocol and calculation methods. Please see individual testing standards for more information relative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

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

FlexHead Shown with 3 Bends

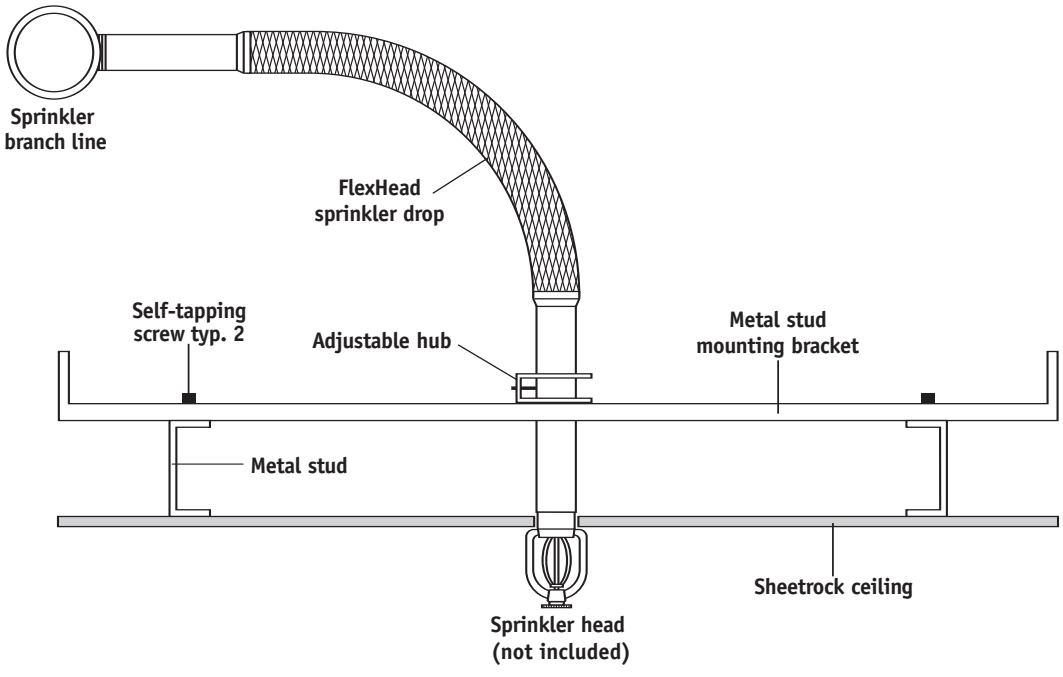


FlexHead Suspended Ceiling Detail

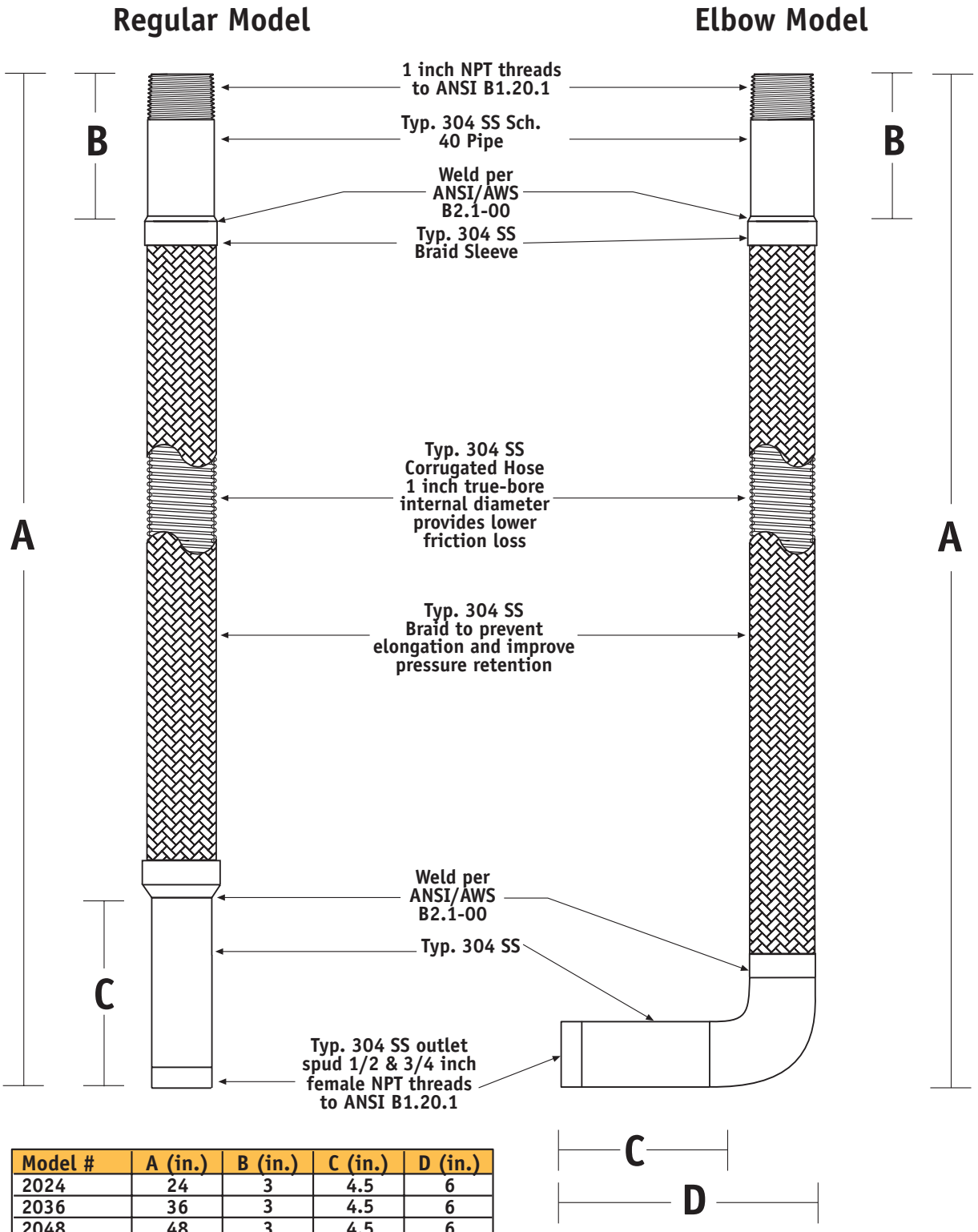


Each FM approved, UL listed, LPCB certified unit is ready to install, pressure- and leak-tested, and comes complete with a flexible stainless steel hose and mounting bracket with adjustable hub.

FlexHead Sheetrock Ceiling Detail



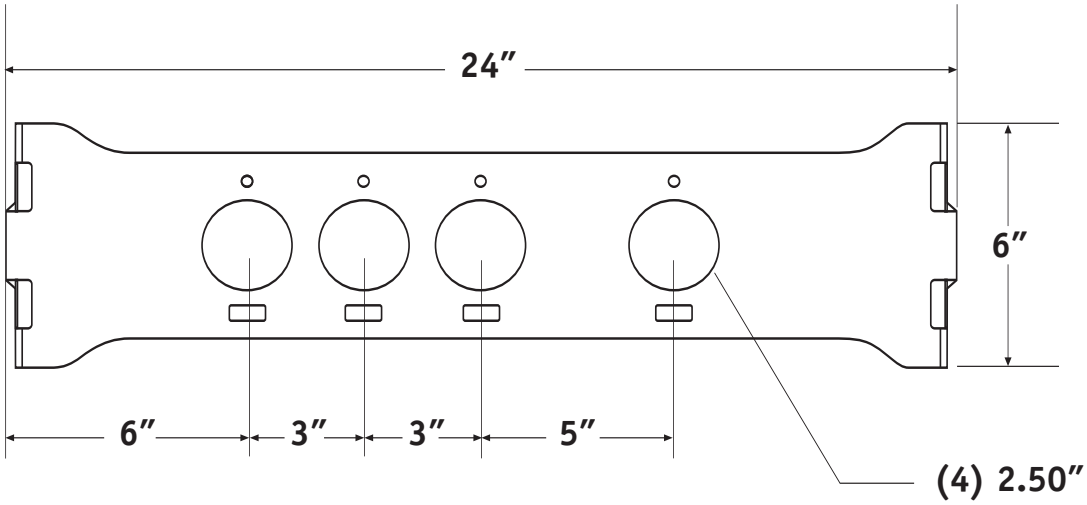
Hose Specification Sheet



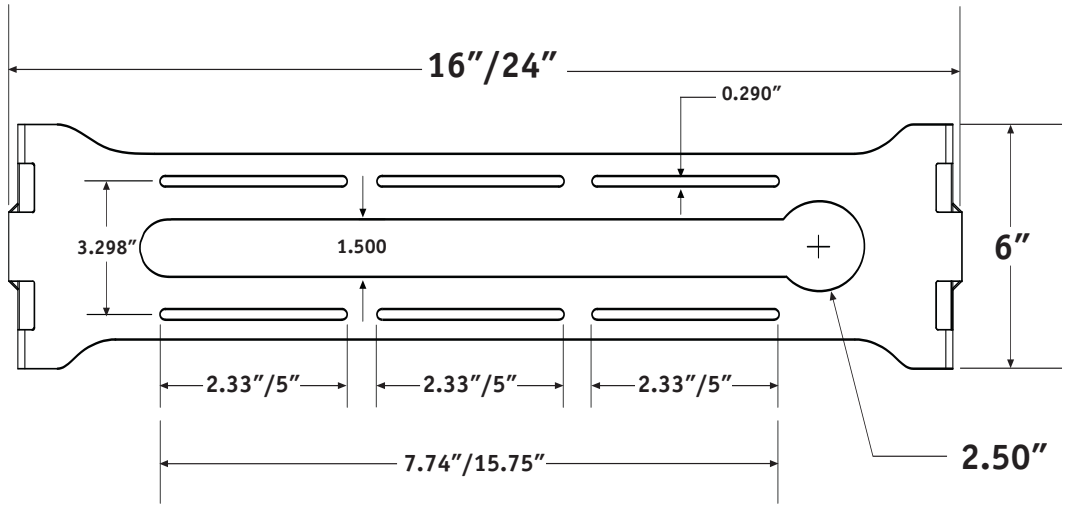
Model #	A (in.)	B (in.)	C (in.)	D (in.)
2024	24	3	4.5	6
2036	36	3	4.5	6
2048	48	3	4.5	6
2060	60	3	4.5	6
2072	72	3	4.5	6

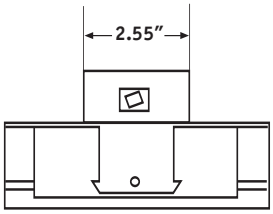
Bracket Specification Sheet

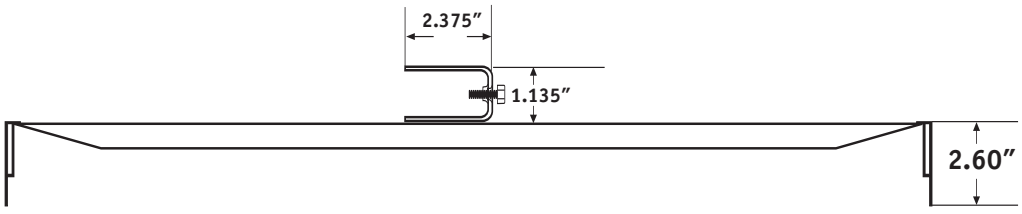
Multiport Design (For use with T-bar grid and metal stud applications)



Adjustable Design (For use with T-bar grid, metal stud, and Chicago grid applications): standard sizes are 16″ and 24″ long







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.

FM 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	TZ = Tech Zone	24 = Length in inches of bracket
AD-16-BKT-2	AD = Adjustable	06 = Length in inches of bracket
AD-24-BKT-2		16 = Length in inches of bracket
	BKT = 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 place 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 — VENF.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 dated August 20, 2008.

Testing and Certifications

Loss Prevention Certification Board — Loss Prevention Standard LPS 1261*

FlexHead® series 2000 stainless steel sprinkler connections

Hydrostatic Pressure

Flexible hose will be subjected to 4 times the maximum working pressure for a period of one hour. *FlexHead successfully passed this test.*

Elevated Temperature Test

Flexible hose will be subjected to elevated temperature of 122F (50C) for 90 days, then subjected to 4 times the maximum working pressure. *FlexHead successfully passed this test.*

Sulphuric Acid Test

Flexible hose will be subjected to 4 times the maximum working pressure after conditioning in sulphuric acid. *FlexHead successfully passed this test.*

Crushing Load Test

The flexible connection with the cover removed shall be subjected to a crushing load of 100kg applied evenly over a length of 50mm for 30s. The connection shall not collapse or show signs of permanent deformation in excess of 5% of any appropriate dimension measured before the test. *FlexHead successfully passed this test.*

Salt Spray Test

Flexible hose will be subjected to salt spray conditioning in accordance to BSEN 60068-2-53:1996 Test K6 Salt Mist Cyclic (Severity 1). Then it will be subjected to hydrostatic test 4 times maximum working pressure. *FlexHead successfully passed this test.*

SO2 Conditioning Test

Flexible hose will be subjected to 4 times the maximum working pressure after completion of the SO2 conditioning. *FlexHead successfully passed this test.*

Dry Pipe Fire Test

A flexible assembly shall be pressured with air to 3 bar for 3 minutes. The flexible hose assembly shall then be subjected to a fire test. The air pressure shall be kept constant by venting. The flexible hose must maintain integrity of the pipework throughout the test. *FlexHead successfully passed this test.*

Sprinkler head Activation Test

Flexible hose and bracketing system will be installed to installation instructions into a 600mm x 600mm ceiling tile. Sprinkler head will be activated at 12 bar (175 PSI) and maintain running pressure at 11 bar (160 PSI) for 2 minutes. The sprinkler head must remain in position. *FlexHead successfully passed this test.*

Pressure Loss Test

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

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

Loss Prevention Certification Board

LPCB

APPENDIX TO CERTIFICATE NO. 764a

FLEXHEAD INDUSTRIES INC.
56 Lowland Street, Holliston, MA 01746, USA

Model	Length (mm)	Nominal Size / Connection		Max. Working Pressure (bar)	LPCB Ref. No.
		Supply	Outlet		
2024	600	R1 (1" NPT) or (1" BSPT) External thread	Rc½ or Rc¾ (½" or ¾" NPT) or (½" or ¾" BSP Internal thread	12	764a/01
2036	900				
2048	1200				
2060	1500				
2072	1800				
2024H	600	R1 (1" NPT) or (1" BSPT) External thread	Rc½ or Rc¾ (½" or ¾" NPT) or (½" or ¾" BSP Internal thread	20	764a/02
2036H	900				
2048H	1200				
2060H	1500				
2072H	1800				

See table footnotes on page 3

This certificate is valid until withdrawn by LPCB.
To check the validity and the authenticity of this certificate please visit our website www.RedBookLive.com or contact us.

Signed on behalf of the LPCB

Date of Issue 21 June 2006

Name: Simon Bird

LPCB is part of BRE Certification Ltd., Garston, Watford WD25 9XX. Tel +44 (0)1923 664100
Fax +44 (0)1923 664603 www.RedBookLive.com

PRE-APPROVAL OF ANCHORAGE FOR FIXED HOSPITAL EQUIPMENT

Application No. OPA-0672
FM APPROVAL AND UL FIRE SPRINKLER CONNECTIONS

has been examined for conformance to the current requirements adopted by the Office of Statewide Health Planning and Development, Facilities Development Division.

Signed this Thursday, August 12, 2004.

STATE OF CALIFORNIA, HEALTH AND HUMAN SERVICES AGENCY
OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

Program Administrator

This approval must be renewed every three (3) years. Other conditions requiring renewal are listed below:

1. Changes in the applicable codes and regulations.
2. Changes in the manufactured product (fixed equipment).
3. Changes in the methods of anchorage or anchorage devices.

List of Approved Documents:

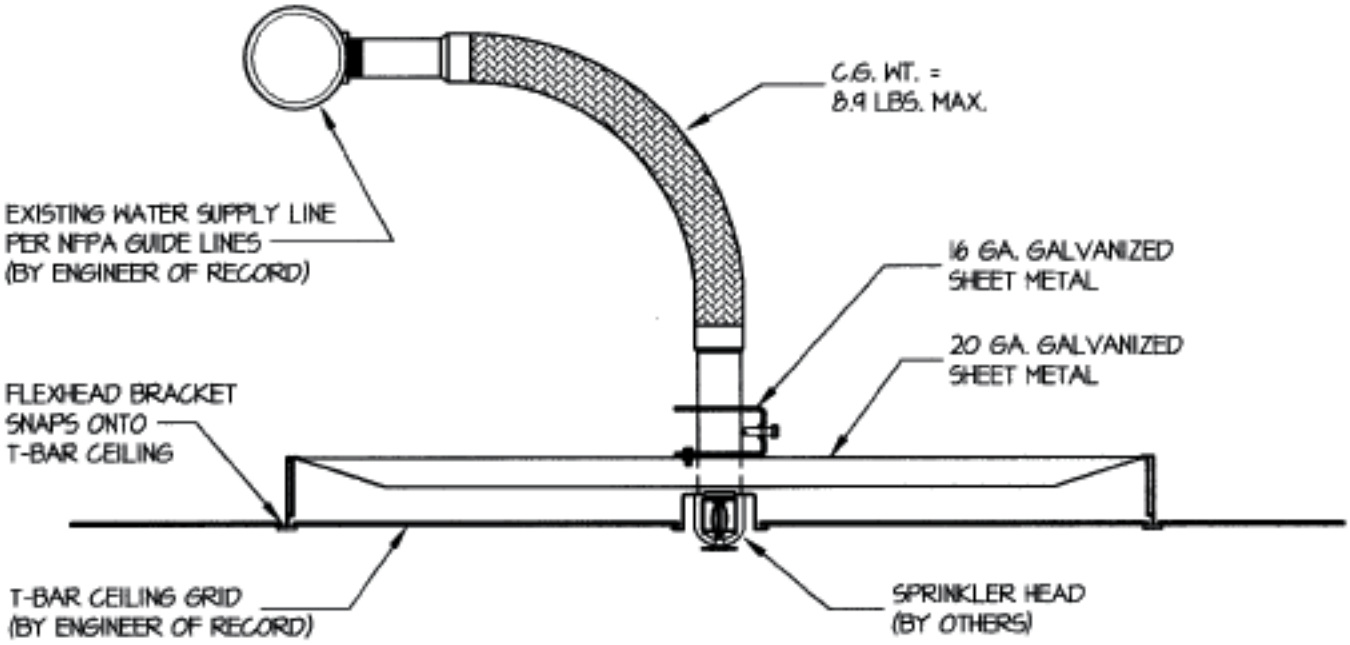
- Sheet Nos. Sheet 1 of 2 through Sheet 2 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING
www.equipmentanchorage.com

FLEXHEAD INDUSTRIES	DES. R. LA BRIE	SHEET 1
FLEXHEAD SPRINKLER CONNECTIONS MODEL # 2024, 2036, 2048, 2060, 2072	JOB NO. 11-0441	
	DATE 8/10/04	OF 2 SHEETS

SEISMIC ANCHORAGE PRE-APPROVED DETAIL — CEILING MOUNT

Office of Statewide Health Planning and Development
ANCHORAGE PRE-APPROVAL



ELEVATION

GENERAL NOTES:

1. FORCES ARE DETERMINED PER 2001 CBC SECTION 1632A, C_a = .66, a_p = 1.0, I_p = 1.5, R_p = 3.0
   HORIZONTAL FORCE (V_H) = 0.94W
   VERTICAL FORCE (V_V) = 0.33(V_H)
2. ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN.

REGISTERED PROFESSIONAL ENGINEER ★ JAMES H. THOMPSON ★ No. 1389 ★ 8/10/04 ★ STRUCTURAL ★ STATE OF CALIFORNIA ★ License Exp. date 3-31-2005

APPROVED
Fixed Equipment Anchorage
Office of Statewide Health Planning and Development
OPA- 0672 August 10, 2004
**** Valid for 3 Years Maximum ****
John Gillengerten (916) 654-3547

Note: OSHPD does not currently enforce expiration dates. All pre-approvals are valid regardless of expiration.

333 Pfingsten Road
Northbrook, Illinois 60062-2096
United States Country Code (1)
(847) 272-8800
FAX No. (847) 272-8129
http://www.ul.com

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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

National Fire Protection Association
1 Batterymarch Park, Quincy, MA 02169-7471
Phone: 617-770-3000 • Fax: 617-770-0700 • 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 BUILDINGS
NYC Department of Buildings
280 Broadway, New York, NY 10007
Patricia J. Lancaster, FAIA, Commissioner

Donald Gottfried, P.E.
Director, MEA Division
212.566.3282
212.566.3840 fax
donaldg@buildings.nyc.gov

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

Date: January 10, 2004.

Dear Applicant:

Enclosed is a final official signed copy of MEA acceptance of your product(s), MEA 261-99-E, Vol. 3. which you may use as proof of your product(s) 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(s) installed is (are) 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

Very truly yours,

Donald Gottfried, P.E.
Director
Materials and Equipment Acceptance Division

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 best idea in sprinkler systems since water

FGG/BM/CZ SYSTEM COMPATIBLE · FM APPROVED · c UL us LISTED · LPCB · USGBC MEMBER

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Holliston, Massachusetts 01746
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www.flexhead.com

1M/SDP/03-09