11901 East 14th Ave. Aurora, CO 80010
303-366-4905 Fax 303-366-4966
95 Talamine Court Colorado Springs, CO 80907
719-244-9523 Fax 719-559-2874
Tony Rhoads Office:
303-366-4905 Ext. 440 Fax:
303-366-4966
Email: tonyr@arapahoefire.com

Aurora Building Division
15151 E. Alameda Parkway
Aurora, CO 80012

Attn: Fire Plan Review

Subject: Scope of Work Letter

Per the requirements of Aurora Building Division, *(Arapahoe Fire Protection)* is submitting the following scope of work letter for *(Hybrid OR 9 @ TMCA)* project located in the City of Aurora in order to receive a fire sprinkler permit. The scope of work is as follows:

Project Name: **Hybrid OR 9 @ TMCA**

Project Address: **1501 S. Potomac St. Level 1 Aurora, CO 80012**

Project Scope: **We are relocating (7) new QR SSP sprinklers to accommodate new lighting locations. All areas in the scope of work are light hazard operating room areas.**

Arapahoe Fire Protections work performed as part of this project shall not adversely affect the remote area of the hydraulic sprinkler system. All work will be performed in accordance with the 2013 Edition of NFPA 13 and we will contact Aurora Building Division for a rough and final inspection. I understand that I must pay for and pick up the issued permit before I call for this inspection. If you have any questions regarding this project please feel free to contact me at *(303) 505-3640*

Sincerely,

Tony Rhoads
Arapahoe Fire Protection LLC.
TI Department Design Manager

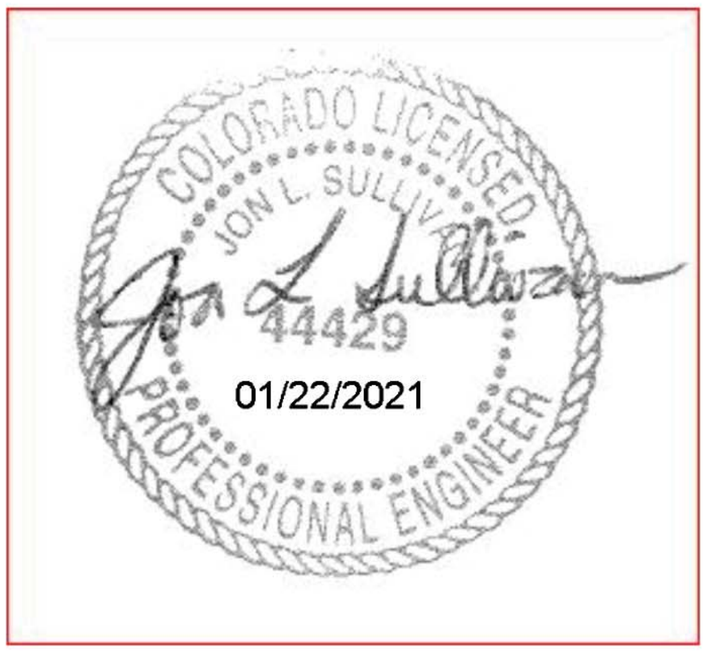


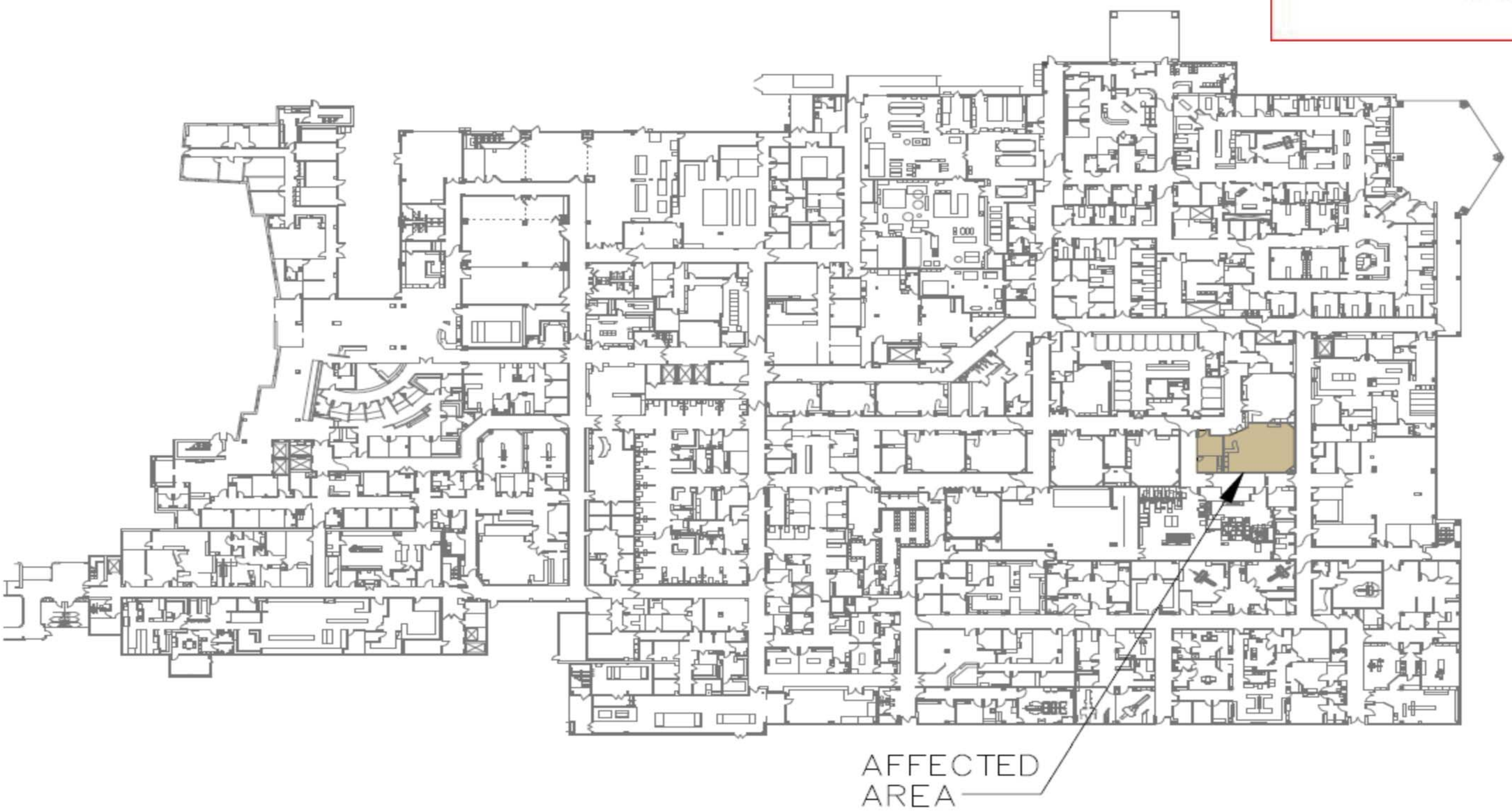
Items determined to be in violation of code during inspection are required to be corrected; this review does not grant approval of code violations.

City of Aurora
Adopted Codes & Standards for this project:
2015-ICC - 2020-NEC
2013 NFPA 13 - 2013 NFPA 72
Amendments to include Chapters 22 & 66

City of Aurora Building Division
Counter Permit intake by: JLG
Date: *Jan 27, 2021*
RSN: *1514837*
Permit: *2021-19251566-CT*
2015 INTERNATIONAL CODES & **2020** NEC Scope of permit to be field verified.

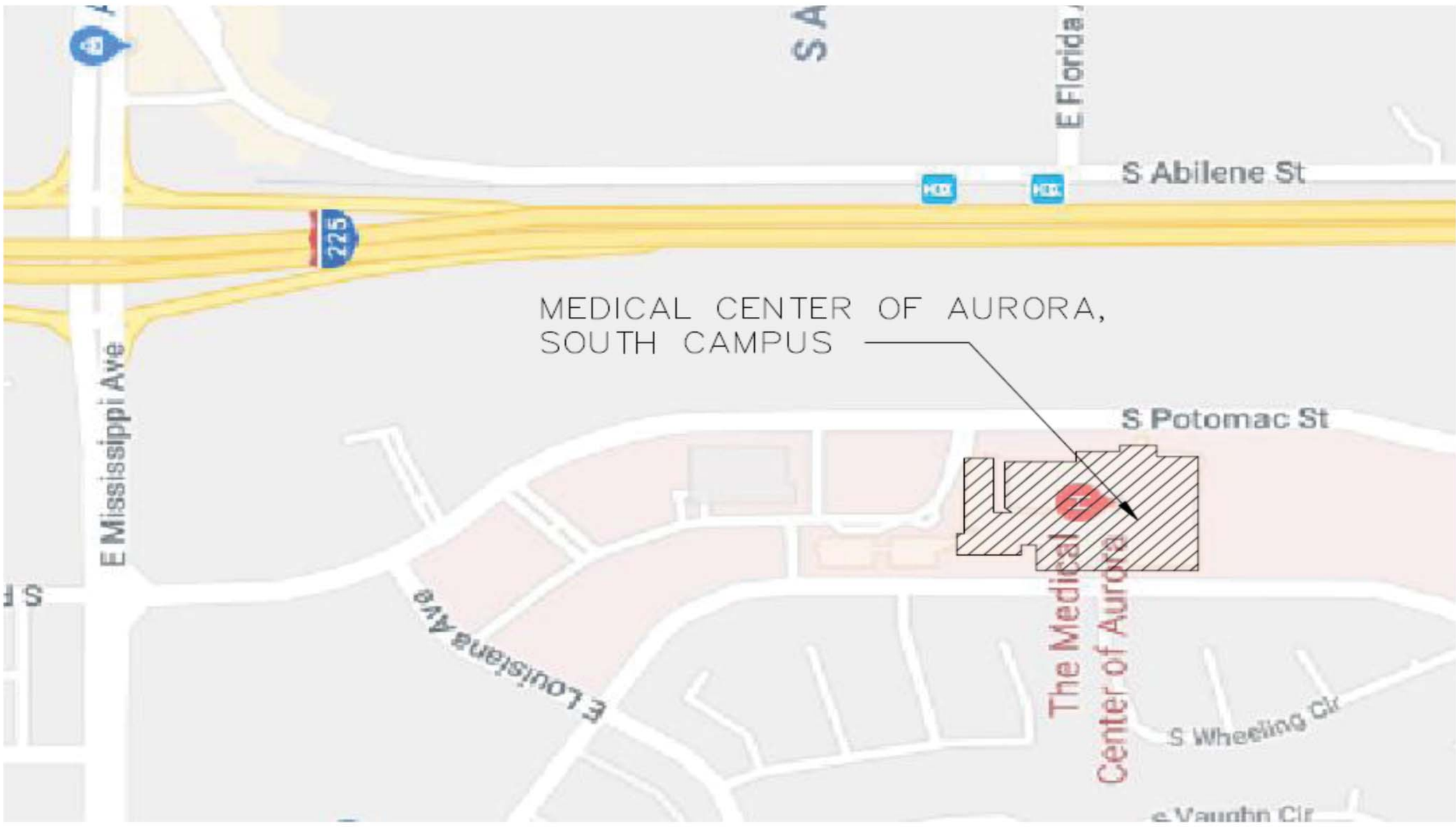
RELOCATE (7) NEW QR SSP SPRINKLERS FOR NEW LIGHT LOCATIONS





KEY PLAN
NTS

NORTH



VICINITY MAP
NTS

NORTH

FireLock® V27, K5.6
Models V2703, V2707, V2704, V2708

40.10


V2703/V2704
Upright


V2707/V2708
Pendent


V2707/V2708
Recessed Pendent


V2707/V2708
Pendent w/V9


V2703/V2704
Upright w/V9

1.0 PRODUCT DESCRIPTION

Models: V2703, V2704, V2707, V2708

Style: Pendent, Upright or Recessed Pendent

Nominal Orifice Size: 1/2"/13 mm

K Factor: 5.6 Imp./8.1 S.I.[1]

Nominal Connection Size: 1/2" NPT/20 mm BSPT/IGS Grooved

Max. Working Pressure:

- 175 psi/1200 kPa (FM)
- 250 psi/1725 kPa (UL)

Factory Hydrostatic Test: 100% @ 500 psi/3450 kPa

Min. Operating Pressure:

- 7 psi/48 kPa
- 0.35 bar/5 psi (VdS for upright only)

Temperature Rating: See chart

[1] For K-Factor when pressure is measured in Bar, multiply S.I. units by 10.0.

2.0 CERTIFICATION/LISTINGS

c UL us LISTED · FM · LPCB · CCC · VdS · CE 0786

Threaded and IGS connections have different approvals/listings. See tables on pages 2 and 3.

ALWAYS REFER TO ANY NOTIFICATIONS AT THE END OF THIS DOCUMENT REGARDING PRODUCT INSTALLATION, MAINTENANCE OR SUPPORT.

System No.		Location	
Submitted By		Date	

Spec Section		Paragraph	
Approved		Date	

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2.0 CERTIFICATION/LISTINGS (CONTINUED)

Threaded Sprinkler Approvals/Listings:

APPROVALS/LISTINGS	Model					
	V2703	V2707	V2707	V2704	V2708	V2708[3]
Orifice Size (inches)	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
Orifice Size (mm)	13	13	13	13	13	13
Nominal K Factor Imperial	5.6	5.6	5.6	5.6	5.6	5.6
Nominal K Factor S.I.[2]	8.1	8.1	8.1	8.1	8.1	8.1
Response	Standard	Standard	Standard	Quick	Quick	Quick
Deflector Type	Upright	Pendent	Recessed Pendent	Upright	Pendent	Recessed Pendent
Approved Temperature Ratings	**F°/C°**					
cULus	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C 500°F/260°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C 500°F/260°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C
FM	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C
NYC/MEA 62-99-E	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C
CSFM 7690-0531:112	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C
LPCB	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C	None	None	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C	None	None
CCC	ZSTZ 155°F/68°C 200°F/93°C	ZSTX 155°F/68°C 200°F/93°C	None	K-ZSTZ 155°F/68°C 200°F/93°C	K-ZSTZ 155°F/68°C 200°F/93°C	None
VdS	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C	None	None	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	None	None
CE	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C	None	None	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	None	None

[2] For K Factor when pressure is measured in Bar, multiply S.I. units by 10.0

[3] FM Approved with ½" adjustment escutcheon only - quick response

NOTE

- Listings and Approvals as of printing. All are approved open.

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2.0 CERTIFICATION/LISTINGS (CONTINUED)

IGS Sprinkler Approvals/Listings

APPROVALS/LISTINGS	Model			
	V2703	V2707	V2704	V2708
Orifice Size (inches)	1/2"	1/2"	1/2"	1/2"
Orifice Size (mm)	13	13	13	13
Nominal K-Factor Imperial	5.6	5.6	5.6	5.6
Nominal K-Factor S.I.[2]	8.1	8.1	8.1	8.1
Response	Standard	Standard	Quick	Quick
Deflector Type	Upright	Pendent	Upright	Pendent
Adjustment				
Approved Temperature Ratings	**F°/C°**			
cULus	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C 500°F/260°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C 500°F/260°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C
FM	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C 360°F/182°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C

[2] For K-Factor when pressure is measured in bar, multiply S.I. units by 10.0

NOTE

- Listings and Approvals as of printing. All are approved open.

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3.0 SPECIFICATIONS – MATERIAL

Upright Deflector: Bronze

Pendent Deflector: Bronze

Bulb: Glass with glycerin solution

Bulb Nominal Diameter:

☐ Standard: 5.0 mm

☐ Quick Response: 3.0 mm

Load Screw: Bronze

Pip Cap: Bronze

Spring: Beryllium nickel

Seal: PTFE tape

Frame: Die cast brass

Lodgement Spring: Stainless steel

Installation Wrench:

☐ Open End: V27

☐ Recessed: V27-2

☐ 3/16 Hex Bit: V9 coupling

Sprinkler Finishes:

☐ Plain Brass[4]

☐ Chrome plated

☐ White polyester coated[5]

☐ Black painted[5]

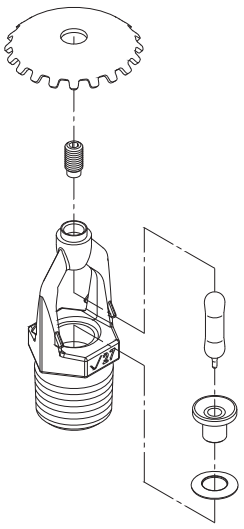
☐ Custom painted[5]

☐ VC-250[6]

[4] Plain Brass is only available for the V9 coupling.

[5] UL Listed for corrosion resistance.

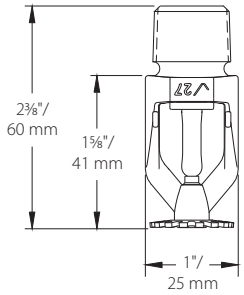
[6] UL Listed and FM Approved for corrosion resistance.



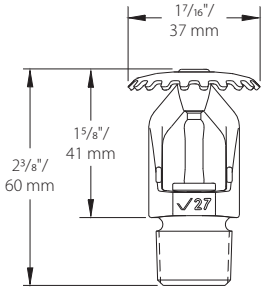
Exaggerated for clarity

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4.0 DIMENSIONS



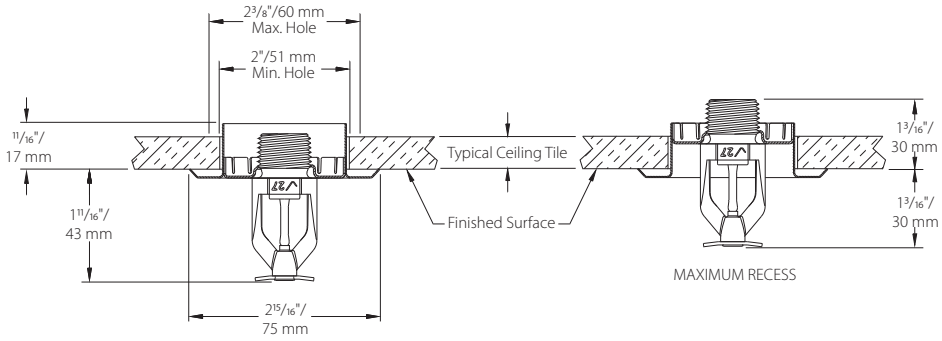
Standard Pendent with/without standard V9 coupling – V2707, V2708



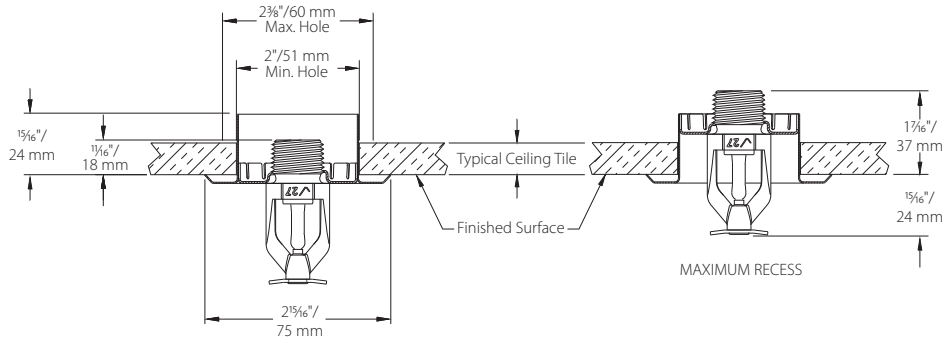
Standard Upright with/without standard V9 coupling – V2703, V2704

NOTE:

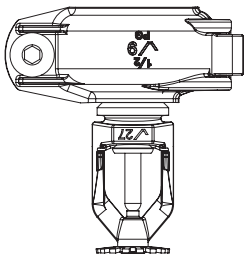
- V27, K5.6 sprinklers with Style V9 coupling dimensions are the same as threaded sprinkler dimensions.



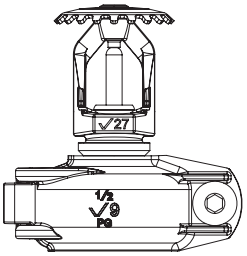
½" Adjustment Recessed – V2707, V2708 (drawing not to scale)



¾" Adjustment Recessed – V2707, V2708 (drawing not to scale)



Standard Pendent with V9 Sprinkler Coupling – V2707, V2708



Standard Upright with V9 Sprinkler Coupling – V2703, V2704

NOTE:

- IGS options are not available for recessed applications.

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5.0 PERFORMANCE

Sprinkler is to be installed and designed as per NFPA, FM Datasheets, or any local standards.

6.0 NOTIFICATIONS

⚠ WARNING



- **Always read and understand installation, care, and maintenance instructions, supplied with each box of sprinklers, before proceeding with installation of any sprinklers.**
- **Always wear safety glasses and foot protection.**
- **Depressurize and drain the piping system before attempting to install, remove, or adjust any Victaulic piping products.**
- **Installation rules, especially those governing obstruction, must be strictly followed.**
- **Painting, plating, or any re-coating of sprinklers (other than that supplied by Victaulic) is not allowed.**

Failure to follow these instructions could result in serious personal injury and/or property damage.

The owner is responsible for maintaining the fire protection system and devices in proper operating condition. For minimum maintenance and inspection requirements, refer to the current National Fire Protection Association pamphlet that describes care and maintenance of sprinkler systems. In addition, the authority having jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

If you need additional copies of this publication, or if you have any questions about the safe installation of this product, contact Victaulic World Headquarters: P.O. Box 31, Easton, Pennsylvania 18044-0031 USA, Telephone: 001-610-559-3300.

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7.0 REFERENCE MATERIALS

Ratings

All glass bulbs are rated for temperatures from –65°F/–54°C to those shown in table below.

Sprinkler Temperature Classification	Victaulic Part Identification	Temperature – °F/°C		Glass Bulb Color
		Nominal Temperature Rating	Maximum Ambient Temperature Allowed	
Ordinary	A	135°F/57°C	100°F/38°C	Orange
Ordinary	C	155°F/68°C	100°F/38°C	Red
Intermediate	E	175°F/79°C	150°F/65°C	Yellow
Intermediate	F	200°F/93°C	150°F/65°C	Green
High	J	286°F/141°C	225°F[8]/107°C	Blue
Extra High[7]	K	360°F/182°C	300°F/149°C	Purple
–	M	Open	–	No bulb
Ultra High[7]	N	500°F/260°C	475°F/246°C	Black

[7] Standard response only.

Available Wrenches:

Sprinkler Type	V27-2 Recessed	V27 Open End	Hex-Bit
V2707, V2708 Pendent	✓	✓	–
V2707, V2708 Recessed Pendent	✓	–	–
V2703, V2704 Upright	–	✓	–
V2703, V2704 Upright w/V9	–	–	✓
V2707, V2708 Pendent w/V9	–	–	✓

NOTE

- $^{3}/_{16}$-inch hex bit provided with V9 coupling shipment.

29.01: Victaulic Terms and Conditions of Sale

I-40: Victaulic FireLock™ Automatic Sprinklers

I-V9: Style V9 Victaulic FireLock™ IGS™ Installation-Ready™ Sprinkler Coupling Installation Instructions

User Responsibility for Product Selection and Suitability
Each user bears final responsibility for making a determination as to the suitability of Victaulic products for a particular end-use application, in accordance with industry standards and project specifications, and the applicable building codes and related regulations as well as Victaulic performance, maintenance, safety, and warning instructions. Nothing in this or any other document, nor any verbal recommendation, advice, or opinion from any Victaulic employee, shall be deemed to alter, vary, supersede, or waive any provision of Victaulic Company's standard conditions of sale, installation guide, or this disclaimer.

Intellectual Property Rights
No statement contained herein concerning a possible or suggested use of any material, product, service, or design is intended, or should be constructed, to grant any license under any patent or other intellectual property right of Victaulic or any of its subsidiaries or affiliates covering such use or design, or as a recommendation for the use of such material, product, service, or design in the infringement of any patent or other intellectual property right. The terms "Patented" or "Patent Pending" refer to design or utility patents or patent applications for articles and/or methods of use in the United States and/or other countries.

Note
This product shall be manufactured by Victaulic or to Victaulic specifications. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.

Installation
Reference should always be made to the Victaulic installation handbook or installation instructions of the product you are installing. Handbooks are included with each shipment of Victaulic products, providing complete installation and assembly data, and are available in PDF format on our website at www.victaulic.com.

Warranty
Refer to the Warranty section of the current Price List or contact Victaulic for details.

Trademarks
Victaulic and all other Victaulic marks are the trademarks or registered trademarks of Victaulic Company, and/or its affiliated entities, in the U.S. and/or other countries.

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Eddythread 40

A Lightweight Schedule 40 Replacement Pipe That Has a Corrosion Resistance Ratio of 1.0

Bull Moose Tube Company has been making pipe for a long time and is recognized as a producer of quality pipe products. Eddythread 40 is designed with the same thoroughness as our other fine pipe products and now our customers have an option to buy a carefully designed replacement for Schedule 40 that:

- Has a Corrosion Resistance Ratio of 1.0
- Has a Pressure Rating of 300 psi
- Is Lighter Weight Than Schedule 40
- Is Approved by Factory Mutual and Listed by Underwriters Laboratories
- Is Produced in Accordance to ASTM A-135 and A-795
- Can be Used With Standard Schedule 40 Threaded Fittings, Couplings and Valves
- Is Produced From Steel With Excellent Properties of Strength and Threadability
- Can be Used in Wet, Dry, Preaction, and Deluge Type Sprinkler Systems*
- Offers Lower Freight Costs

EDDYTHREAD 40 SPECIFICATIONS

NOMINAL PIPE SIZE (in)	WEIGHT (lbs/ft)	I.D. (in)	BUNDLE SIZE
1	1.461	1.083	70
1 1/4	2.070	1.418	51
1 1/2	2.547	1.654	44
2	3.308	2.123	30

CORROSION RESISTANCE RATIOS

NOMINAL PIPE SIZE (in)	SCHEDULE 40	EDDYTHREAD 40
1	1.00	1.00
1 1/4	1.00	1.00
1 1/2	1.00	1.00
2	1.00	1.00

** Eddythread 40 can be hot dipped galvanized to meet FM's requirement for dry systems*

BULL MOOSE TUBE COMPANY
A CAPARO company

1819 Clarkson Road
Chesterfield, MO 63017
(800) 325-4467
FAX: (636) 537-2645
www.bullmoosetube.com
e-mail:sales@bullmoosetube.com

For additional information, contact your salesperson today at (800) 325-4467 or (636) 537-2600 in the USA, or from Canada call (800) 882-4666

All information contained herein is accurate as known at the time of publication. Bull Moose Tube reserves the right to change product specifications without notice and without incurring obligation.

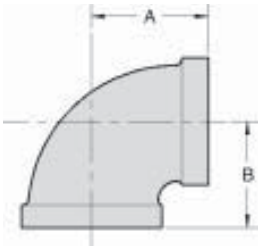
RSN: 1514837
Permit # 2021-1921566-CT
Sheet 11 of 17

D.I. THREADED FITTINGS

S.P FITTINGS
A Division of Star Pipe Products

LISTED LISTED APPROVED

For fire protection services request submittal GRS 1.3

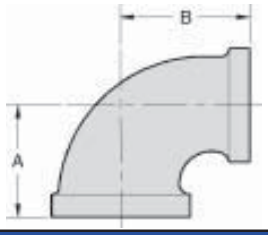


DUCTILE IRON THREADED FITTINGS ARE UL, ULC LISTED AND FACTORY MUTUAL APPROVED FOR 500 PSI SERVICE. DUCTILE IRON PER ASTM A 536 GRADE 65-45-12. DIMENSIONS CONFORM TO ANSI B16.3 CLASS 150. THREADS ARE NPT PER ANSI/ASME B1.20.1

NOTICE: DUCTILE IRON FITTINGS HAVE HIGHER TENSILE STRENGTH THEN THAT OF STEEL PIPE. THEREFORE, OVER TIGHTENING CAN CAUSE DAMAGE TO PIPE THREADS WHICH MAY CAUSE LEAKAGE. DUCTILE IRON FITTINGS SHOULD BE TIGHTENED THREE TURNS BEYOND HAND TIGHT, BUT NO MORE THAN FOUR TURNS.

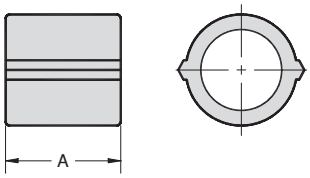
DUCTILE IRON 90 DEG. ELBOW

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSIONS A	DIMENSIONS B	WEIGHT EACH PIECE
1	DB90033	500	1.50	1.50	0.62
1 1/4	DB90044	500	1.75	1.75	0.90
1 1/2	DB90055	500	1.94	1.94	1.20
2	DB90066	500	2.25	2.25	1.85



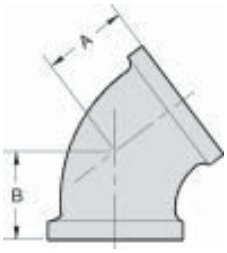
DUCTILE IRON RED.90 DEG. ELBOW

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSIONS A	DIMENSIONS B	WEIGHT EACH PIECE
1X1/2	DB90031	500	1.26	1.36	0.44
1X3/4	DB90032	500	1.37	1.45	0.52
1 1/4X1/2	DB90041	500	1.34	1.53	0.64
1 1/4X3/4	DB90042	500	1.45	1.62	0.72
1 1/4X1	DB90043	500	1.58	1.67	0.75
1 1/2X1	DB90053	500	1.65	1.80	0.92
1 1/2X1 1/4	DB90054	500	1.82	1.88	1.08
2X1/2	DB90061	500	1.49	1.88	1.08
2X3/4	DB90062	500	1.60	1.97	1.24
2X1	DB90063	500	1.73	2.02	1.40
2X1 1/4	DB90064	500	1.90	2.10	1.52
2X1 1/2	DB90065	500	2.02	2.16	1.65



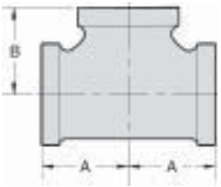
DUCTILE IRON COUPLING

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSION A	WEIGHT EACH PIECE
1	DCL033	500	1.67	0.40
1 1/4	DCL044	500	1.93	0.57
1 1/2	DCL055	500	2.15	0.75
2	DCL066	500	2.53	1.15



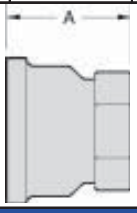
DUCTILE IRON 45 DEG. ELBOW

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSIONS A	DIMENSIONS B	WEIGHT EACH PIECE
1	DB45033	500	1.12	1.12	0.46
1 1/4	DB45044	500	1.29	1.29	0.73
1 1/2	DB45055	500	1.43	1.43	0.92
2	DB45066	500	1.68	1.68	1.50



DUCTILE IRON STRAIGHT TEE

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSIONS A	DIMENSIONS B	WEIGHT EACH PIECE
1	DT333	500	1.50	1.50	0.85
1 1/4	DT444	500	1.75	1.75	1.22
1 1/2	DT555	500	1.94	1.94	1.55
2	DT666	500	2.25	2.25	2.45



DUCTILE IRON RED. COUPLING

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSION A	WEIGHT EACH PIECE
1X1/2	DRC031	500	1.69	0.39
1X3/4	DRC032	500	1.69	0.53

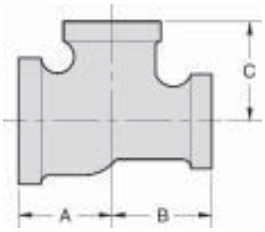
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D.I. THREADED FITTINGS

S.P FITTINGS
A Division of Star Pipe Products

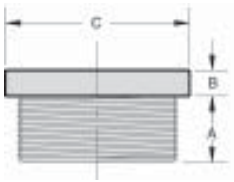
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For fire protection services request submittal GRS 1.3

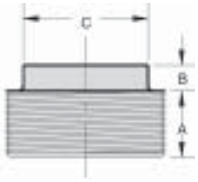


DUCTILE IRON REDUCING TEE

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSIONS A	B	C	WEIGHT EACH PIECE
1X1X1/2	DT331	500	1.26	1.26	1.36	0.64
1X1X3/4	DT332	500	1.37	1.37	1.45	0.73
1X1/2X1	DT313	500	1.50	1.36	1.50	0.71
1X3/4X1	DT323	500	1.50	1.45	1.50	0.76
1X1X1 1/4	DT334	500	1.67	1.67	1.58	0.98
1X1X1 1/2	DT335	500	1.80	1.80	1.65	1.16
1 1/4X1X1/2	DT431	500	1.34	1.26	1.53	0.82
1 1/4X1X3/4	DT432	500	1.45	1.37	1.62	0.90
1 1/4X1X1	DT433	500	1.58	1.50	1.67	1.00
1 1/4X1X1 1/4	DT434	500	1.75	1.67	1.75	1.08
1 1/4X1X1 1/2	DT435	500	1.88	1.80	1.82	1.42
1 1/4X1 1/4X1/2	DT441	500	1.34	1.34	1.53	0.86
1 1/4X1 1/4X3/4	DT442	500	1.45	1.45	1.62	0.92
1 1/4X1 1/4X1	DT443	500	1.58	1.58	1.67	0.95
1 1/4X1 1/4X1 1/2	DT445	500	1.88	1.88	1.82	1.45
1 1/4X1 1/4X2	DT446	500	2.10	2.10	1.90	1.75
1 1/2X1X1/2	DT531	500	1.41	1.34	1.66	0.95
1 1/2X1X3/4	DT532	500	1.52	1.37	1.75	1.14
1 1/2X1X1	DT533	500	1.65	1.50	1.80	1.17
1 1/2X1X1 1/4	DT534	500	1.82	1.67	1.88	1.34
1 1/2X1X1 1/2	DT535	500	1.94	1.80	1.94	1.45
1 1/2X1 1/4X1/2	DT541	500	1.41	1.34	1.66	1.05
1 1/2X1 1/4X3/4	DT542	500	1.52	1.45	1.75	1.15
1 1/2X1 1/4X1	DT543	500	1.65	1.58	1.80	1.25
1 1/2X1 1/4X2	DT546	500	2.16	2.10	2.02	1.90
1 1/2X1 1/2X1/2	DT551	500	1.41	1.41	1.16	1.15
1 1/2X1 1/2X3/4	DT552	500	1.52	1.52	1.75	1.24
1 1/2X1 1/2X1	DT553	500	1.65	1.65	1.80	1.30
1 1/2X1 1/2X1 1/4	DT554	500	1.82	1.82	1.88	1.48
1 1/2X1 1/2X2	DT556	500	2.16	2.16	2.02	1.98
2X1X2	DT636	500	2.25	2.02	2.25	2.15
2X1 1/4X2	DT646	500	2.25	2.10	2.25	2.30
2X1 1/2X1/2	DT651	500	1.49	1.41	1.88	1.50
2X1 1/2X3/4	DT652	500	1.60	1.52	1.97	1.62
2X1 1/2X1	DT653	500	1.73	1.65	2.02	1.64
2X1 1/2X1 1/4	DT654	500	1.90	1.82	2.10	1.80
2X1 1/2X1 1/2	DT655	500	2.02	1.94	2.16	2.00
2X1 1/2X2	DT656	500	2.25	2.16	2.25	2.35
2X2X1/2	DT661	500	1.49	1.49	1.88	1.60
2X2X3/4	DT662	500	1.60	1.60	1.97	1.68
2X2X1	DT663	500	1.73	1.73	2.02	1.85
2X2X1 1/4	DT664	500	1.90	1.90	2.10	2.04
2X2X1 1/2	DT665	500	2.02	2.02	2.16	2.18
2X2X2 1/2	DT667	500	2.60	2.60	2.39	3.61
2 1/2X2X3/4	DT762	500	1.74	1.60	2.32	2.28



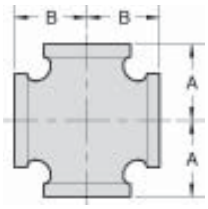
OUTSIDE HEAD



INSIDE HEAD

DUCTILE IRON BUSHINGS

NOMINAL SIZE (INCH)	ITEM CODE #	DIMENSIONS A	B	C	STYLE	WT. EACH
1x1/2	DBUSH31	0.75	0.25	1.42	OUT	0.22
1x3/4	DBUSH32	0.75	0.25	1.42	OUT	0.17
1 1/4x1	DBUSH43	0.80	0.28	1.76	OUT	0.28
1 1/2x1	DBUSH53	0.83	0.31	2.00	OUT	0.44
1 1/2x1 1/4	DBUSH54	0.83	0.31	2.00	OUT	0.30
2x1	DBUSH63	0.88	0.41	1.95	IN	0.66
2x1 1/4	DBUSH64	0.88	0.34	2.48	OUT	0.72
2x1 1/2	DBUSH65	0.88	0.34	2.48	OUT	0.61



DUCTILE IRON CROSS

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I	DIMENSIONS A	B	WEIGHT EACH PIECE
1	DX033	500	1.50	1.50	0.98
1 1/4	DX044	500	1.75	1.75	1.50
1 1/2	DX055	500	1.94	1.94	1.90
2	DX066	500	2.25	2.25	2.95
1 1/4X1	DX043	500	1.58	1.67	1.27
1 1/2X1	DX053	500	1.65	1.80	1.48
2X1	DX063	500	1.73	2.02	2.10



DUCTILE IRON CAP

NOMINAL SIZE (INCH)	ITEM CODE #	MAX. WORKING P.S.I.	DIMENSION A	WEIGHT EACH PIECE
1	DCP003	500	1.16	0.32
1 1/4	DCP004	500	1.28	0.43
1 1/2	DCP005	500	1.33	0.60
2	DCP006	500	1.45	0.91

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☐ Fig. 135 and 135i: Straight with Sight-Hole Rod Coupling
☐ Fig. 135E: Straight Less Sight-Hole
☐ Fig. 135R: Reducing

Size Range: 1/4" through 1"
Material: Carbon steel
Finish: ☐ Fig. 135 and 135i: Plain; ☐ Fig.135E Zinc Plated and ☐ Fig.135R Zinc Plated
Service: For connecting rods to accommodate up to 1" diameter and support up to 5,900 pounds.
Ordering: Specify rod size, figure number and name.



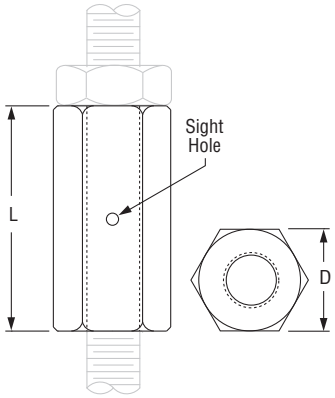


FIG 135, 135I, 135E, 135R: DIMENSIONS (IN) • LOADS (LBS) • WEIGHTS (LBS)				
Rod Size A	**Max Load**	**Weight**	**D**	**L**
Fig. 135 & 135i: Straight With Sight-Hole				
3/8	730	0.09	9/16	1 1/8
1/2	1,350	0.12	3/4	1 1/2
5/8	2,160	0.24	15/16	1 7/8
3/4	3,230	0.42	1 1/8	2 1/4
7/8	4,480	0.66	1 5/16	2 5/8
1	5,900	1.00	1 1/2	3
Fig. 135E: Straight Less Sight-Hole				
1/4	240	0.03	3/8	7/8
3/8	730	0.09	5/8	1 1/8
1/2	1,350	0.14	11/16	1 3/4
5/8	2,160	0.26	13/16	2 1/8
3/4	3,230	0.34	1	2 1/4
7/8	4,480	0.55	1 1/4	2 1/2
1	5,900	0.75	1 3/8	2 3/4
Fig. 135R: Reducing				
3/8 x 1/4	240	0.13	5/8	1 1/2
1/2 x 3/8	730	0.13	11/16	1 1/4
5/8 x 1/2	1,350	0.19	13/16	1 1/4
3/4 x 5/8	2,160	0.26	1	1 1/2
7/8 x 3/4	3,230	0.41	1 1/4	1 3/4

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ Approved
Address:	☐ Approved as noted
Contractor:	☐ Not approved
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

Fig. 200 - “Trimline” Adjustable Band Hanger

Size Range — 1/2" thru 8" pipe

Material — Carbon Steel, Mil. Galvanized to G90 specifications

Function — For fire sprinkler and other general piping purposes. Knurled swivel nut design permits hanger adjustment after installation.

Features —

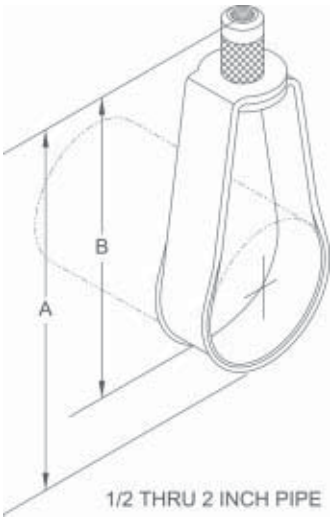
- (1/2" thru 2") Flared edges ease installation for all pipe types and protect CPVC plastic pipe from abrasion. Captured design keeps adjusting nut from separating with hanger. Hanger is easily installed around pipe.
- (2½" thru 8" Spring tension on nut holds it securely in hanger before installation. Adjusting nut is easily removed.

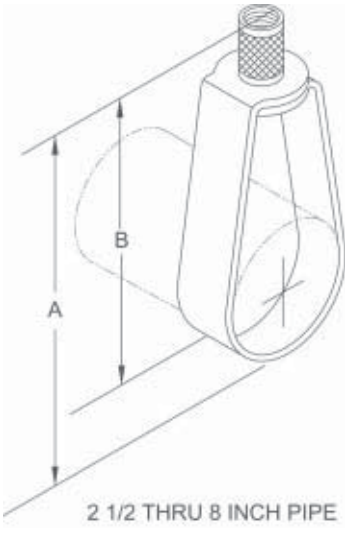
Approvals — Underwriters’ Laboratories listed (1/2" thru 8") in the USA **(UL)** and Canada **(cUL)** for steel and CPVC plastic pipe and Factory Mutual Engineering Approved (3/4" thru 8"). Conforms to Federal Specifications WW-H-171E, Type 10 and Manufacturers Standardization Society SP-69, Type 10.

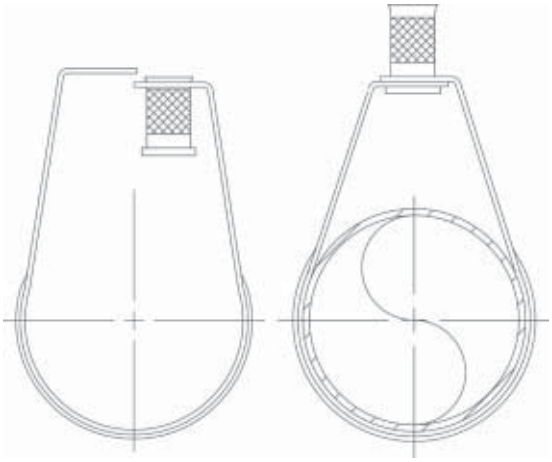
Maximum Temperature — 650°F

Finish — Mil. Galvanized. For Stainless Steel materials, order TOLCO™ Fig. 200WON.

Order By — Figure number and pipe size







Dimensions • Weights

Pipe Size	Rod Size Inch	Rod Size Metric	A	B	Max. Rec. Load Lbs.	Approx. Length
1/2	3/8	8mm or 10mm	3 1/8	2 5/8	400	11
3/4	3/8	8mm or 10mm	3 1/8	2 1/2	400	11
1	3/8	8mm or 10mm	3 3/8	2 5/8	400	12
1 1/4	3/8	8mm or 10mm	3 3/4	2 7/8	400	13
1 1/2	3/8	8mm or 10mm	3 7/8	2 7/8	400	14
2	3/8	8mm or 10mm	4 1/2	3	400	15
2 1/2	3/8	10mm	5 5/8	4 1/8	600	27
3	3/8	10mm	5 7/8	4	600	29
3 1/2	3/8	10mm	7 3/8	5 1/4	600	34
4	3/8	10mm	7 3/8	5	1000	35
5	1/2	12mm	9 1/8	6 1/4	1250	66
6	1/2	12mm	10 1/8	6 3/4	1250	73
8	1/2	12mm	13 1/8	8 3/4	1250	136

Main Office/Manufacturing Facility • 1375 Sampson Ave. • Corona, CA 92879 • Ph: 909.737.5599 • Fax: 909.737.0330
Customer Service • 800.786.5266
www.tolco.com

3.2.11.1 Product description
3.2.11.2 Material specifications
3.2.11.3 Technical data
3.2.11.4 Installation instructions
3.2.11.5 Ordering information

3.2.11 STUD FASTENERS FOR ATTACHMENT TO CONCRETE

3.2.11.1 PRODUCT DESCRIPTION

The Hilti threaded stud program is for use with Hilti powder-actuated tools to provide a fast and reliable solution for making attachments to concrete base materials. Threaded studs are available in standard carbon steel. The X-W6 and W10 threaded studs have varying shank lengths to provide reliable fastenings to standard and high strength concrete. Thread diameters of 1/4" have thread lengths ranging from 1/2" through 1-1/2". The 3/8" thread diameter has a single thread length of 1-3/16".



X-W6



W10

Listings/Approvals

ICC-ES (International Code Council)
ESR-1663

COLA (City of Los Angeles)
RR 25646

FM (Factory Mutual)
W10-30-27P10, W10-30-32P10 and W10-30-42P10 Fasteners for Sprinkler Pipe Hangers

UL (Underwriters Laboratories)
W10-30-32P10 and W10-30-42P10, Fasteners for Sprinkler Pipe Hangers - Up to 2-1/2" diameter pipe

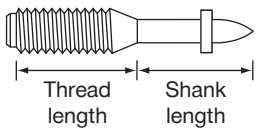
3.2.11.2 Material specifications

Fastener designation	Fastener material	Fastener plating
X-W6	Carbon Steel	5 µm Zinc[1]
W10	Carbon Steel	5 µm Zinc[1]

1 ASTM B633, SC1, Type III. Refer to Section 2.3.3.1 for more information.

3.2.11.3 Technical data

Fastener designation	Thread designation	Thread length in. (mm)	Shank length in. (mm)
X-W6-20-22	UNC 1/4-inch	**3/4** (20)	**7/8** (22)
X-W6-20-27	UNC 1/4-inch	**3/4** (20)	**1** (27)
X-W6-38-27	UNC 1/4-inch	**1-1/2** (38)	**1** (27)
W10-30-27	UNC 3/8-inch	**1-3/16** (30)	**1** (27)
W10-30-32	UNC 3/8-inch	**1-3/16** (30)	**1-1/4** (32)
W10-30-42	UNC 3/8-inch	**1-3/16** (30)	**1-5/8** (42)



Allowable loads in normal weight concrete[1,2]

Description	Fastener	Shank diameter in. (mm)	Minimum embedment in. (mm)	Concrete compressive strength			
				2000 psi		4000 psi	
				Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
1/4–20 Threaded stud	X-W6	**0.145** (3.7)	**3/4** (19)	**40** (0.18)	**55** (0.24)	**40** (0.18)	**55** (0.24)
			1 (25)	**85** (0.38)	**195** (0.87)	**110** (0.49)	**225** (1.00)
3/8–16 Threaded stud	W10	**0.205** (5.2)	**1** (25)	**85** (0.38)	**95** (0.42)	**100** (0.44)	**105** (0.47)
			1-1/4 (32)	**175** (0.78)	**345** (1.53)	**200** (0.89)	**380** (1.69)
			1-5/8 (41)	**285** (1.27)	**380** (1.69)	**385** (1.71)	**395** (1.76)

1 The tabulated allowable load values are for the low-velocity fasteners only, using a safety factor that is greater than or equal to 5.0, calculated in accordance with ICC-ES AC70. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
2 Multiple fasteners are recommended for any attachment.

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Allowable Loads in Minimum f'$_c$ = 3000 psi Structural Lightweight Concrete[1,4]

Fastener description	Fastener	Shank dia. in. (mm)	Min. embed. in. (mm)	Fastener location				
				Installed into concrete		Installed through 3" deep metal deck into concrete[2,3]		
				Tension lb (kN)	Shear lb (kN)	Tension lb (kN)		Shear lb (kN)
						Upper flute	Lower flute	
1/4–20 Threaded Stud	X-W6	0.145 (3.7)	3/4 (20)	125 (0.56)	185 (0.82)	125 (0.56)	115 (0.54)	185 (0.82)
			1 (25)	175 (0.78)	185 (0.82)	160 (0.71)	180 (0.80)	185 (0.82)
3/8–16 Threaded Stud	W10	0.205 (5.2)	1 (25)	265 (1.18)	190 (0.85)	160 (0.71)	–	185 (0.82)
			1-1/4 (32)	280 (1.25)	380 (1.69)	160 (0.71)	210 (0.93)	470 (2.09)
			1-5/8 (41)	445 (1.98)	540 (2.40)	435 (1.93)	325 (1.45)	675 (3.00)

1 The tabulated allowable load values are for the low-velocity fasteners only, using a safety factor that is greater than or equal to 5.0, calculated in accordance with ICC-ES AC70. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.

2 The steel deck profile is 3" deep composite floor deck with a thickness of 20 gauge (0.0358"). Figure 1 (Section 3.2.1.6) shows the nominal flute dimensions, fastener locations and load orientations for the deck profile.

3 Structural lightweight concrete fill above top of metal deck shall be a minimum of 3-1/4" deep.

4 Multiple fasteners are recommended for any attachment.

Allowable Loads in Concrete Masonry Units[1,2,3,4,5,8]

Fastener description	Fastener	Shank diameter in. (mm)	Minimum embedment in. (mm)	Hollow CMU				Grout filled CMU			
				Face shell[6]		Mortar joint[6]		Face shell[6]		Mortar joint[6]	
				Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear[7] lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear[7] lb (kN)
1/4-20 Threaded Stud	X-W6	0.145 (3.7)	1 (25)	105 (0.47)	175 (0.78)	80 (0.36)	110 (0.49)	125 (0.56)	175 (0.78)	135 (0.60)	150 (0.67)

1 The tabulated allowable load values are for the low-velocity fastener only, using a safety factor of 5.0 or higher. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.

2 The tabulated allowable load values are for low-velocity fasteners installed in normal weight or lightweight concrete masonry units conforming to ASTM C90.

3 The tabulated allowable load values are for low-velocity fasteners installed in concrete masonry units with mortar conforming to ASTM C270, Type N.

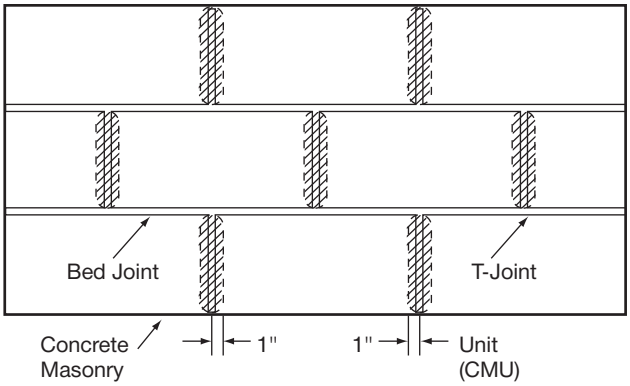
4 The tabulated allowable load values are for low-velocity fasteners installed in concrete masonry units with grout conforming to ASTM C476, as coarse grout.

5 The tabulated allowable load values are for one low-velocity fastener installed in an individual masonry unit cell and at least 4" from the edge of the wall.

6 Fastener can be located anywhere on the face shell or mortar joint as shown in the figure to the right.

7 Shear direction can be horizontal or vertical (Bed Joint or T-Joint) along the CMU wall plane.

8 Multiple fasteners are recommended for any attachment.



Acceptable locations (NON-SHADED AREAS) for threaded studs in CMU walls

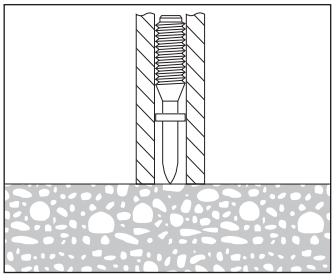
Allowable bending moments for threaded stud fasteners installed in minimum 2,000 psi concrete[1,2]

Fastener designation	M_{rec} ft-lb (Nm)
X-W6	3.6 (4.9)
W10	10.0 (13.6)

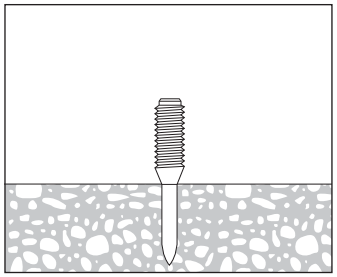
1 Based on a safety factor greater than or equal to 2.0.

2 For more information on bending moments, reference Section 3.2.2.7.

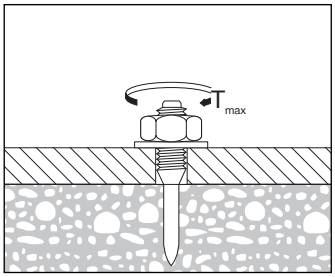
3.2.11.4 INSTALLATION INSTRUCTIONS*



1. Press tip of fastener to concrete base material. Drive fastener with Hilti powder-actuated tool.



2. Ensure proper threaded stud embedment.



3. Make attachment. Do not exceed Maximum Tightening Torque, T_{max}.

* These are abbreviated instructions which may vary by application. **ALWAYS** review/follow the instructions accompanying the product.

Maximum tightening torque, T_{max}, for threaded studs driven into concrete, ft-lb (Nm)

Stud type	
X-W6	W10
3.0 (4.0)	**4.5** (6.0)

3.2.11.5 ORDERING INFORMATION

Fastener description	Shank length in. (mm)	Shank Ø in. (mm)	Thread length in. (mm)	Thread Ø	Guidance washer Ø	Packaging quantity
X-W6-20-22 FP8	**7/8** (22)	**0.145** (3.7)	**3/4** (20)	UNC 1/4-inch	8 mm plastic	100 pcs
X-W6-20-27 FP8	**1** (27)	**0.145** (3.7)	**3/4** (20)	UNC 1/4-inch	8 mm plastic	100 pcs
X-W6-38-27 FP8	**1** (27)	**0.145** (3.7)	**1-1/2** (38)	UNC 1/4-inch	8 mm plastic	100 pcs
W10-30-27 P10	**1** (27)	**0.205** (5.2)	**1-3/16** (30)	UNC 3/8-inch	10 mm plastic	100 pcs
W10-30-32 P10	**1-1/4** (32)	**0.205** (5.2)	**1-3/16** (30)	UNC 3/8-inch	10 mm plastic	100 pcs
W10-30-42 P10	**1-5/8** (42)	**0.205** (5.2)	**1-3/16** (30)	UNC 3/8-inch	10 mm plastic	100 pcs





X-W6



W10*

* W10 threaded stud installation requires a 10mm fastener base plate.