HARNETT COUNTY GSC

203-I-19

Product Data Submittal

Section 1 – Sprinklers

VicFlex™ Style VS1 Dry Sprinkler
Models V3505, V3506, V3509, V3510, V3517, V3518

10.91

1.0 PRODUCT DESCRIPTION

Style: Pendent, Concealed Pendent, Horizontal Sidewall

K Factor: 5.6 Imp./8.1 S.I.

Nominal Orifice Size: ½"/13 mm

Maximum Working Pressure: 175 psi/1200 kPa

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

Minimum Operating Pressure: 7 psi/48 kPa

Connections: To branch line (inlet) via 1"/25 mm NPT or 1" BSPT

Minimum Bend Radius:

- 2"/51 mm

Hazard Classifications: Light and Ordinary Hazard

Maximum Number of Bends:

4

2.0 CERTIFICATION/LISTINGS

	Model					
APPROVALS/LISTINGS	**V3505**	**V3506**	**V3509**	**V3510**	**V3517**	**V3518**
Orifice Size (inches)	½"	½"	½"	½"	½"	½"
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.[6]	8.1	8.1	8.1	8.1	8.1	8.1
Response	Standard	Quick	Standard	Quick	Standard	Quick
Deflector Type	Pendent	Pendent	Hor. SW	Hor. SW	Conc Pen	Conc Pen
Approved Temperature Ratings F°/C°						
	135/57	135/57	135/57	135/57	135/57	135/57
	155/68	155/68	155/68	155/68	155/68	155/68
	175/79	175/79	175/79	175/79	175/79	175/79
	200/93	200/93	200/93	200/93	200/93	200/93
	286/141	286/141	286/141	286/141	–	–

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	

3.0 MATERIAL SPECIFICATIONS

Deflector: Brass

Bulb: Glass with glycerin solution

Bulb Nominal Diameter:

☑ **Quick Response:** 3.0 mm

☐ **Standard Response:** 5.0 mm

Split spacer: Stainless Steel

Load screw: Brass

Pip Cap: Stainless Steel

Spring Seal Assembly: PTFE-coated Beryllium Nickel and Stainless Steel

Frame: Die cast brass 65-30

Flexible Hose: 300-Series Stainless Steel

Collar/Weld Fitting: 300-Series Stainless Steel

Gasket Seal: Victaulic EPDM

Isolation Ring: Nylon

Hose Fittings: Carbon Steel, Zinc-Plated

Inlet Fitting: Brass

Outer tube: 300-Series Stainless Steel

Concealed cup: Carbon Steel, Zinc-plated

Brackets: Carbon Steel, Zinc-plated

3.1 ACCESSORIES SPECIFICATIONS

Sprinkler Finishes:

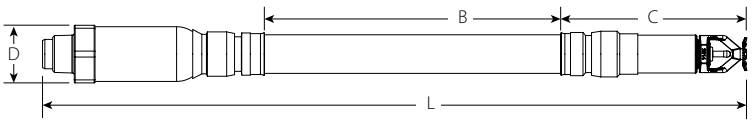
☑ **Standard: VC-250**

☐ **White painted RAL 9010**

4.0 DIMENSIONS

Product Details and Optional Components

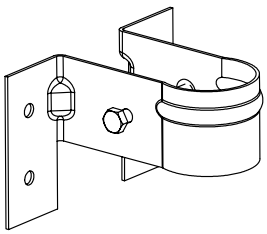
Style VS1 Dry Sprinkler

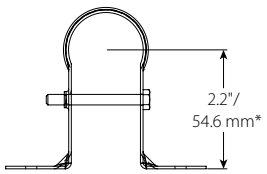


Sprinkler Length inches mm	Overall Length (pendent) L inches mm	Live Length B inches mm	Outlet End Length C inches mm	Maximum OD D inches mm
38 965	39.2 995	25.1 638	6.5 165	2.2 56
50 1270	51.2 1300	37.1 943	65 165	2.2 56
58 1475	59.2 1505	45.1 1145	65 165	2.2 56

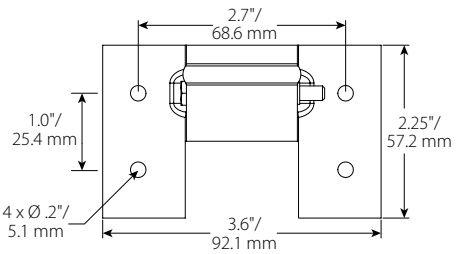
1 Add ½" to Overall Length and Outlet End Length for increased length of sidewall deflector

Style VB1 Bracket



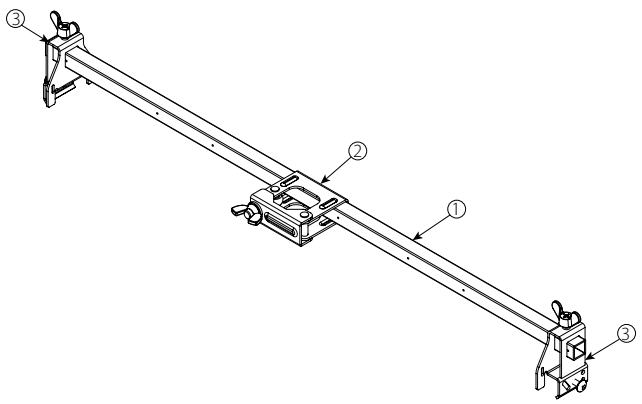


*Note: Theoretical center point of sprinkler in bracket.



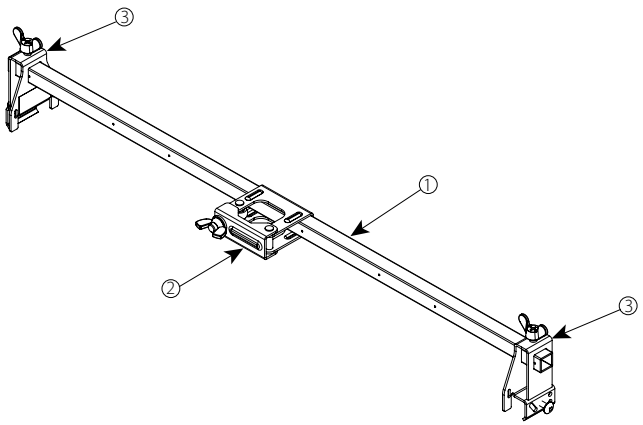
Style VB2 Bracket
Recessed Pendent, Suspended Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented 1-Bee Center Bracket
3	End Bracket



Style VB3 Bracket
Concealed Pendent, Suspended Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented 1-Bee Center Bracket
3	End Bracket



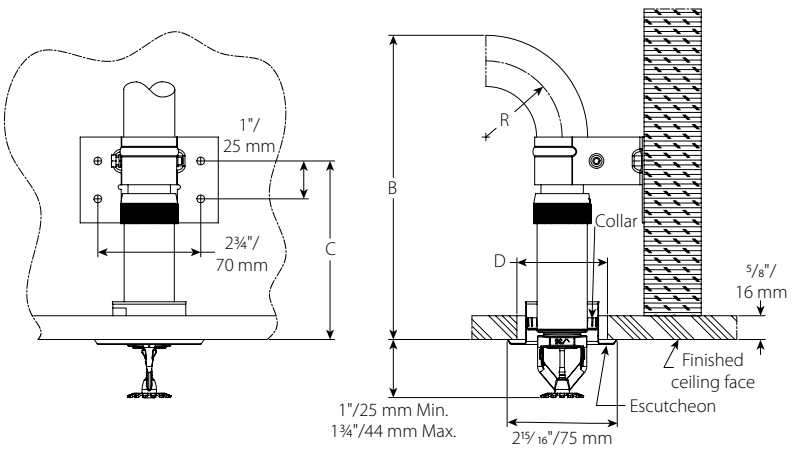
4.1 DIMENSIONS

Sprinkler Finishes: Dimensions and Mounting Conditions:

NOTE:

Drawings are shown with ⅝" finished ceiling thickness. Adjustments to "B" and "C" dimensions will be required if finished ceiling thickness deviate from drawing.

Recessed Pendent:



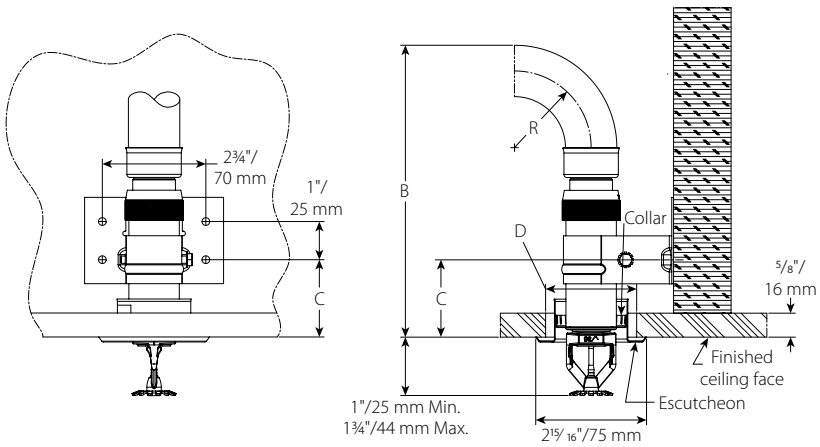
Take-out Chart						
Dimension	inches/mm					
Bend Radius "R"	2/50	3/75	4/100	5/125	6/150	7/175
B	7 ⅝/193	8 ⅝/218	9 ⅝/244	10 ⅝/269	11 ⅝/295	12 ⅝/320
C	4 ¾/119					
Ceiling Hole Diameter "D"	2 - 2 ⅜"/50 - 60mm					

NOTE:

Dimensions are shown with ¾" escutcheon at middle of height adjustment range.

4.2 DIMENSIONS

Recessed Pendent Alternative Bracket Location:



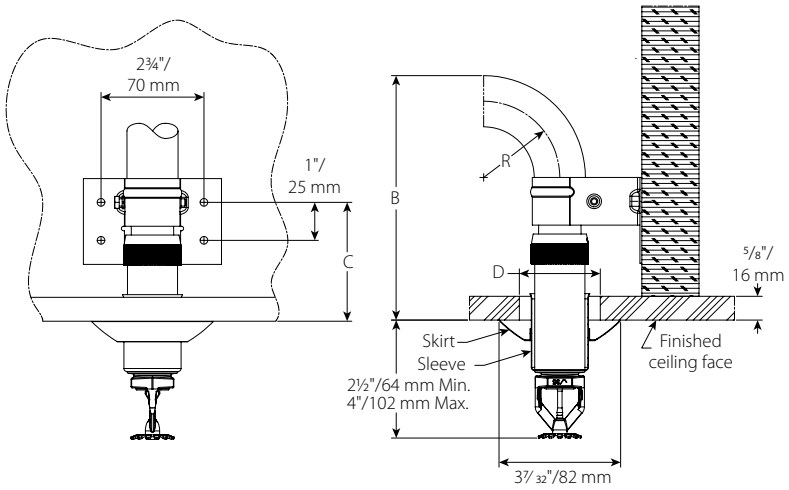
Take-out Chart						
Dimension	inches/mm					
Bend Radius "R"	2/50	3/75	4/100	5/125	6/150	7/175
B	7 5/8/193	8 5/8/218	9 5/8/244	10 5/8/269	11 5/8/295	12 5/8/320
C	2/50					
Ceiling Hole Diameter "D"	2 - 2 3/8/50 - 60					

NOTE:

Dimensions are shown with ¾" escutcheon at middle of height adjustment range.

4.3 DIMENSIONS

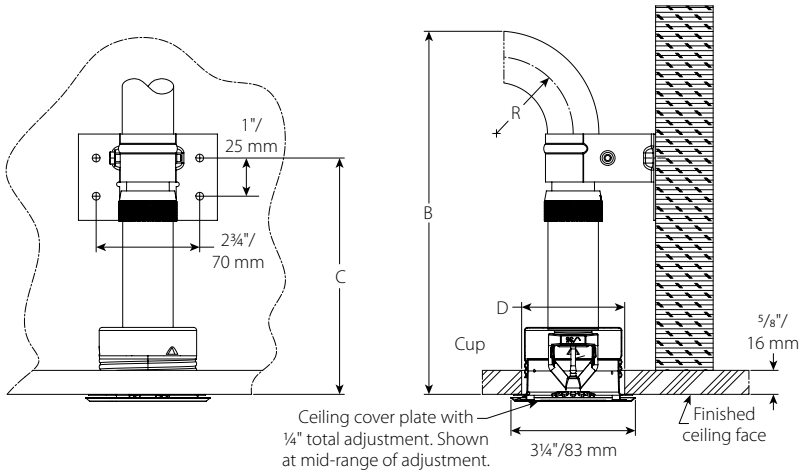
Sleeve and Skirt Pendent:



Hose Clearance Chart						
Dimension	inches/mm					
Bend Radius "R"	2/50	3/75	4/100	5/125	6/150	7/175
B	6 ½/163	7 ½/188	8 ½/213	9 ½/239	10 ½/264	11 ½/290
C	3 ⅛/79					
Ceiling Hole Diameter "D"	1 ¾/44 - 2 ⅛/54					

4.4 DIMENSIONS

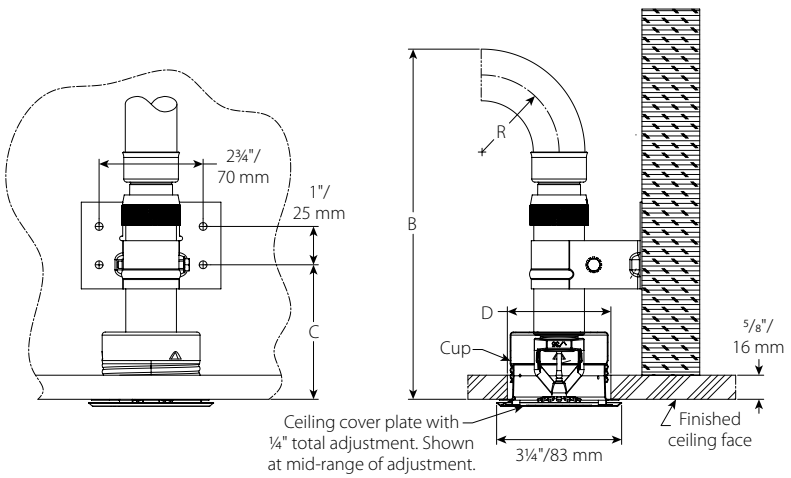
Concealed Pendent:



Hose Clearance Chart						
Dimension	inches/mm					
Minimum Bend Radius "R"	2/50	3/75	4/100	5/125	6/150	7/175
B	9 ½/241	10 ½/267	11 ½/292	12 ½/318	13 ½/343	14 ½/368
C	6 ¼ /157					
Ceiling Hole Diameter "D"	2 ⅝/67 - 2 ¾ /70					

4.5 DIMENSIONS

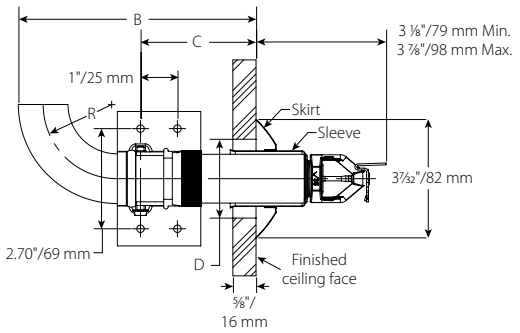
Concealed Pendent Alternative Bracket Location:



Hose Clearance Chart						
Dimension	inches/mm					
Bend Radius "R"	2/50	3/75	4/100	5/125	6/150	7/175
B	9⅛/231	10⅛/257	11⅛/282	12⅛/307	13⅛/333	14⅛/358
C	3½/89					
Ceiling Hole Diameter "D"	2⅝/67 - 2¾/70					

4.6 DIMENSIONS

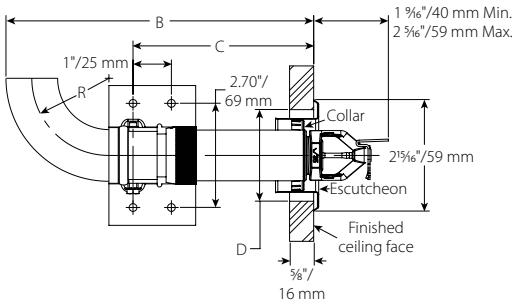
Sleeve and Skirt Sidewall:



Hose Clearance Chart						
Dimension	inches/mm					
Minimum Bend Radius "R"	2/50	3/75	4/100	5/125	6/150	7/175
B	6½/163	7½/188	8½/213	9½/239	10½/264	11½/290
C	3⅛/79					
Ceiling Hole Diameter "D"	1¾/44 - 2⅛/54					

4.7 DIMENSIONS

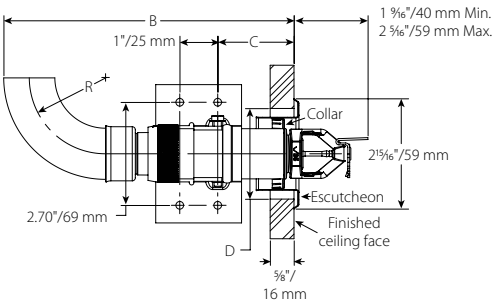
Recessed Sidewall:



Hose Clearance Chart						
Dimension	inches/mm					
Minimum Bend Radius "R"	2/50	3/75	4/100	5/125	6/150	7/175
B	8/203	9/229	10/254	11/279	12/305	13/330
C	4 3⁄4/119					
Ceiling Hole Diameter "D"	2/51 - 2 3⁄8/600					

4.8 DIMENSIONS

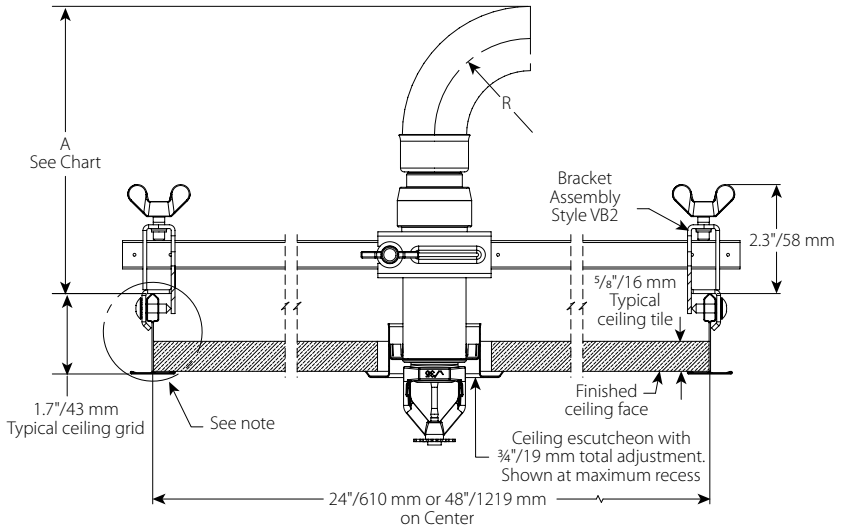
Recessed Sidewall Alternative Bracket Location:



Hose Clearance Chart						
Dimension	inches/mm					
Bend Radius "R"	2/50	3/75	4/100	5/125	6/150	7/175
B	8/203	9/229	10/254	11/279	12/305	13/330
C	2/51					
Ceiling Hole Diameter "D"	2/51 - 2 3⁄8/600					

4.9 DIMENSIONS

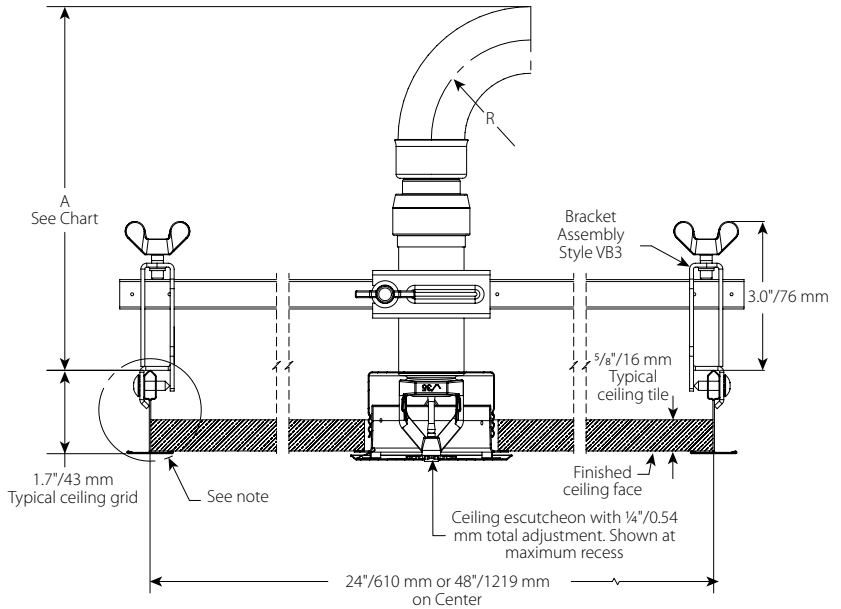
VB2 Recessed Pendent:



Hose Clearance Chart						
Dimension	inches/mm					
Bend Radius "R"	2/50	3/75	4/100	5/125	6/150	7/175
A	6½/163	7½/188	8½/213	9½/239	10½/264	11½/290

4.10 DIMENSIONS

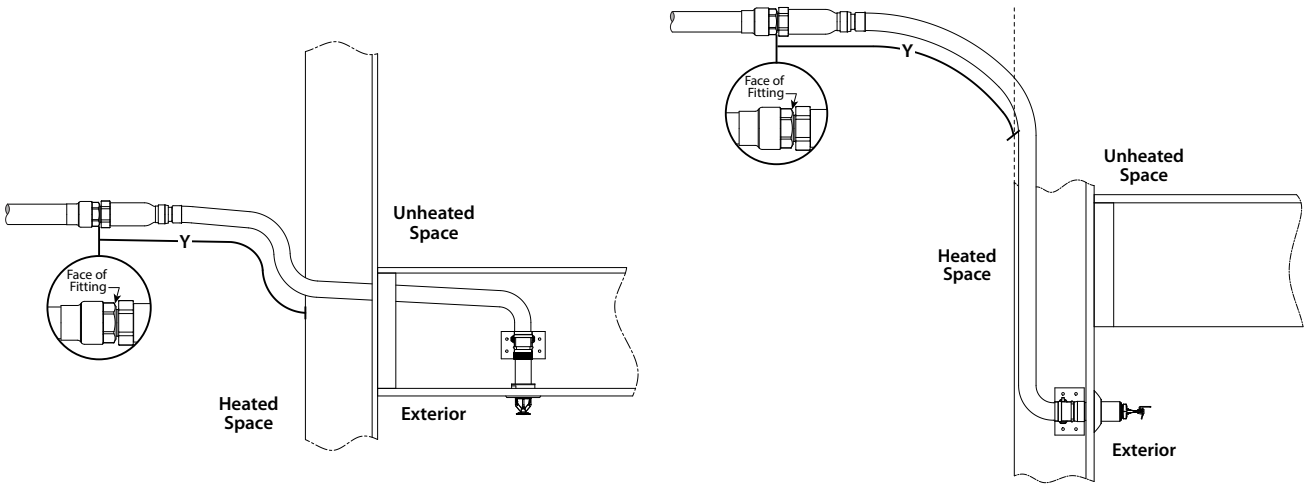
VB3 Concealed Pendent:



Hose Clearance Chart						
Dimension	inches/mm					
Bend Radius "R"	2/50	3/75	4/100	5/125	6/150	7/175
A	7⅝/193	8⅝/218	9⅝/244	10⅝/269	11⅝/295	12⅝/320

5.0 PERFORMANCE

Freeze Protection



Ambient Temperature Exposed to Discharge End of Sprinkler °F °C	Exposed Minimum Barrel Length "Y" inches mm		
	40°F/4°C	50°F/10°C	60°F/16°C
40 4	0 0	0 0	0 0
30 -1	0 0	0 0	0 0
20 -7	4 100	0 0	0 0
10 -12	8 200	1 25	0 0
0 -18	12 300	3 75	0 0
-10 -23	14 350	4 100	1 25
-20 -29	14 350	6 150	3 75
-30 -34	16 400	8 200	4 100
-40 -40	18 450	8 200	4 100
-50 -46	20 500	10 250	6 150
-60 -51	20 500	10 250	6 150

NOTE

- Exposed minimum barrel lengths are inclusive up to 30-mph/48-kph wind velocities.

Maximum Allowable Number of Bends

Sprinkler Length inches mm	Maximum Allowable Number of 90 Bends at 2"/51mm Bend Radius
38 965	4
50 1270	4
58 1475	4

6.0 NOTIFICATIONS

⚠ WARNING

- **It is the responsibility of the system designer to verify suitability of 300-Series stainless steel flexible hose for use with the intended fluid media.**
- **The effect of chemical composition, pH level, operating temperature, chloride level, oxygen level, and flow rate on 300-Series stainless steel flexible hose must be evaluated by the material specifier to confirm system life will be acceptable for the intended service.**

Failure to follow these instructions could cause product failure, resulting in serious personal injury and/or property damage.

Important Installation Notes:

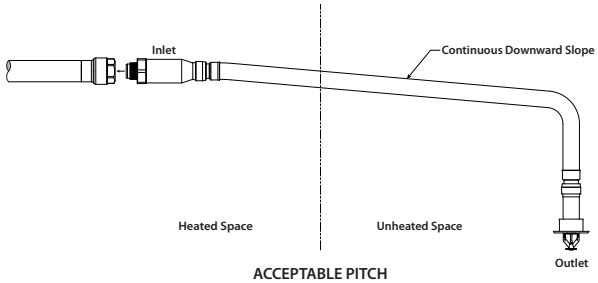
1. Should be installed only in accordance with NFPA 13 Standard for the the Installation of Sprinkler Systems.
2. Install and tighten hexagonal boss at inlet of sprinkler fitting only.
3. DO NOT install the Victaulic® VicFlex™ Style VS1 Dry Sprinkler's inlet into any fitting that interferes with thread penetration. Use a sample fitting to confirm proper engagement.
   To ensure unobstructed flow during operation, the Victaulic® VicFlex™ Style VS1 Dry Sprinkler must be installed into a fitting that will prevent water and debris from accumulating at the dry sprinkler's inlet.
4. Do not remove deflector or inlet end of sprinkler.

FOR DRY SYSTEMS ONLY:
The Style VS1 Dry Sprinkler's inlet MUST be installed only into the outlet of a cast or malleable iron tee that meets the dimensional requirements of ANSI B16.3 and ANSI B16.4, Class 125 and Class 150. Use a sample fitting to confirm proper engagement.

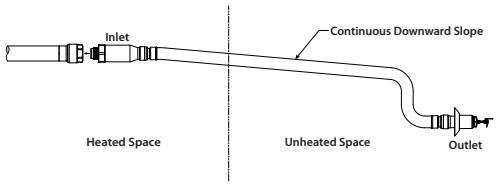
Style VS1 Dry Sprinklers in dry systems must be installed with a continuous downward slope along its entire length from the branch line fitting to the sprinkler. No localized low points shall be present along the length of the Style VS1 Dry Sprinkler.

Style VS1 Dry Sprinklers are not permitted to be installed into the top of the branch line piping. Style VS1 Dry Sprinklers must be installed into the side or from the bottom of the branch line piping.

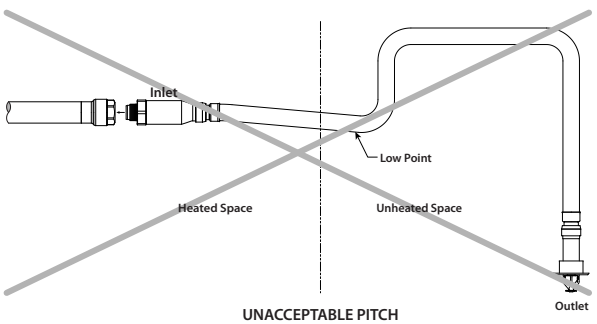
FOR WET SYSTEMS ONLY:
Style VS1 Dry Sprinklers in wet systems, installed where a portion extends into an unconditioned space, must be installed with a continuous downward slope along the entire exposed length from the inside wall to the sprinkler. No localized low points shall be present along the exposed length of the sprinkler.



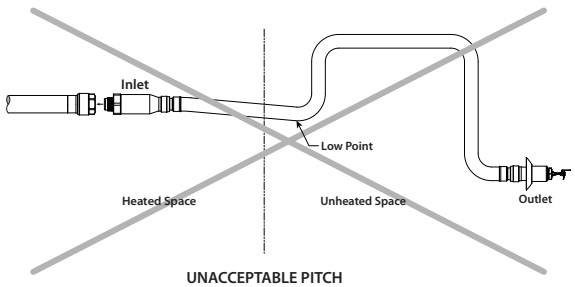
ACCEPTABLE PITCH



ACCEPTABLE PITCH

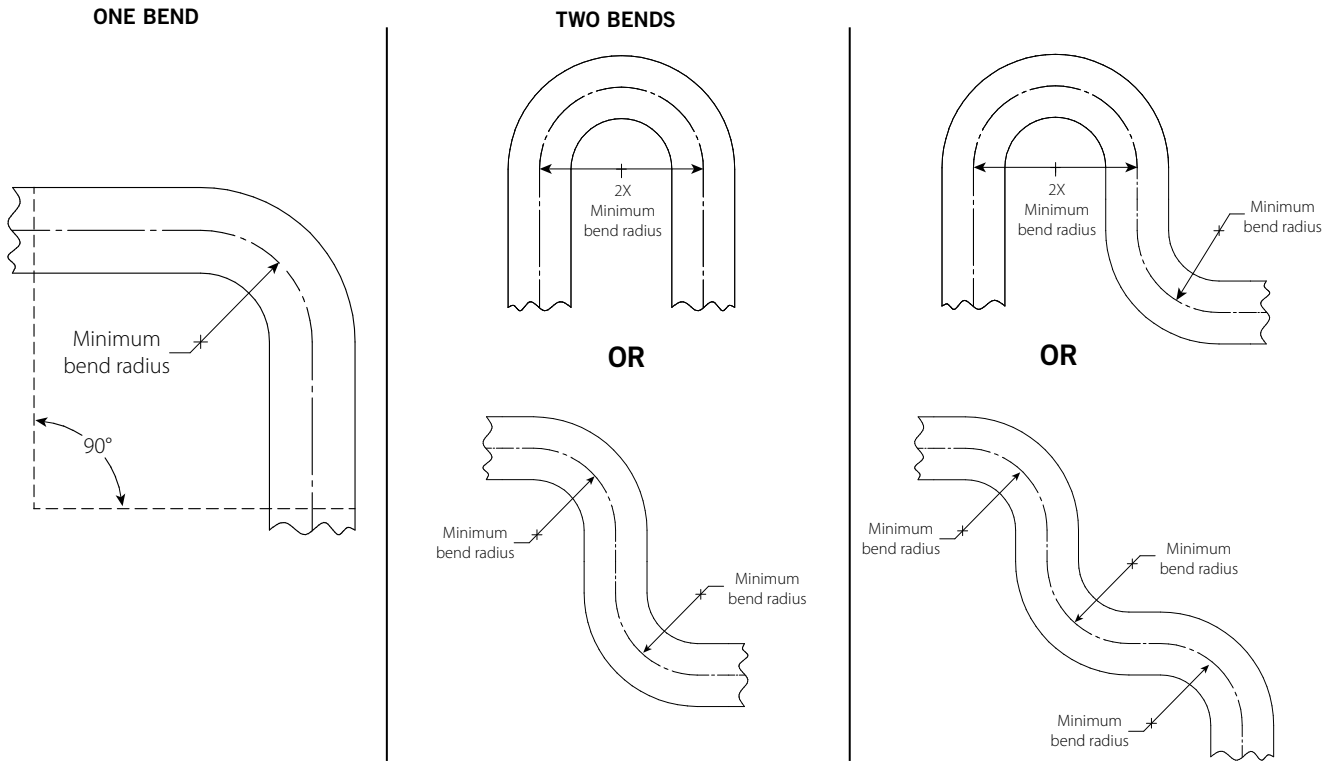


UNACCEPTABLE PITCH



UNACCEPTABLE PITCH

7.0 REFERENCE MATERIALS



NOTE

- For out-of-plane (three-dimensional) bends, care must be taken to avoid imparting torsional stress on the sprinkler.

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

40.10

Standard Spray
Upright, Pendent and Recessed Pendent
Standard and Quick Response

V2703/V2704
Upright

V2707/V2708
Pendent

V2707/V2708
Recessed Pendent

Approvals/Listings:

c UL us FM LPCB VdS CE 0786

See Victaulic Publication 10.01 for more details.

Product Description:

These Model V27 standard spray sprinklers are designed to produce a hemispherical spray pattern for standard commercial applications. They are available with either standard or quick response bulbs. It is cast with a hex-shaped wrench boss to allow easy tightening from many angles, reducing assembly effort. This sprinkler is available in various temperature ratings (see chart on page 3) and finishes to meet many design requirements. The recessed pendent should be utilized with a Model V27 recessed escutcheon which provides up to 3/4"/19 mm of adjustments.

Coverage

For coverage area and sprinkler placement, refer to NFPA 13 or applicable standard.

Technical Specifications:

Models: V2703, V2704, V2707, V2708

Style: Pendent, Upright or Recessed Pendent

Nominal Orifice Size: ½"/13 mm

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

Nominal Thread Size: ½" NPT/15 mm

Max. Working Pressure:

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

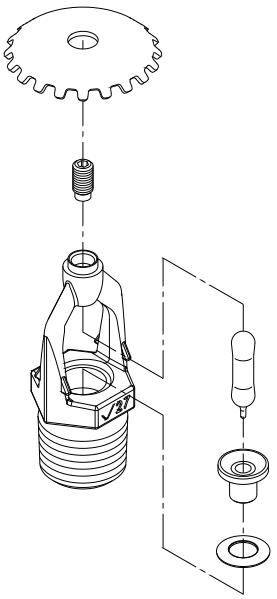
Factory Hydrostatic Test: 100% @ 500 psi/3450 kPa

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.



Exaggerated for clarity

Job/Owner

System No.	
Location	

Contractor

Submitted By	
Date	

Engineer

Spec Section	
Paragraph	
Approved	
Date	

Material Specifications:

Upright Deflector: Bronze per UNS C11000

Pendent Deflector: Bronze per UNS C51000

Bulb: Glass with glycerin solution

Bulb Nominal Diameter:

☐ Standard: 5.0 mm

☑ Quick Response: 3.0 mm

Load Screw: Bronze per UNS C65100

Pip Cap: Bronze per UNS C65100

Spring: Beryllium nickel

Seal: Teflon[2] tape

Frame: Die cast brass 65-30

Lodgement Spring: Stainless steel per UNS S30200

Accessories

Installation Wrench:

☐ Open End: V27

☐ Recessed: V27-2

Sprinkler Finishes:

☑ Plain Brass

☑ Chrome plated

☐ White painted[3]

☐ Black painted[3]

☐ Custom painted[3]

PENDANTS ARE CHROME, UPRIGHTS ARE BRASS

☐ Proprietary Nickel Teflon[2] coating[3]

☐ VC-250[4]

155, 200, 286 SR Only:

☐ Wax[3]

For cabinets and other accessories refer to separate sheet.

[2] Teflon is a registered trademark of Dupont Co.

[3] UL Listed for corrosion resistance.

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

Approvals/Listings:

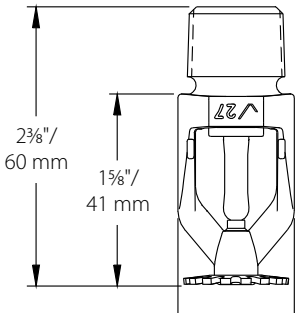
APPROVALS/LISTINGS	Model					
	V2703	V2707	V2707	V2704	V2708	V2708 [7]
Orifice Size (inches)	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
Orifice Size (mm)	13	13	13	13	13	13
Nominal K Factor Imperial	5.6	5.6	5.6	5.6	5.6	5.6
Nominal K Factor S.I.[5]	8.1	8.1	8.1	8.1	8.1	8.1
Response	Standard	Standard	Standard	Quick	Quick	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	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
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
VNIIPO	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
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

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

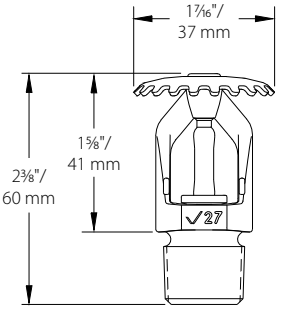
[7] FM Approved with 1/2" adjustment escutcheon only - quick response

Note: Listings and Approvals as of printing. All are approved open.

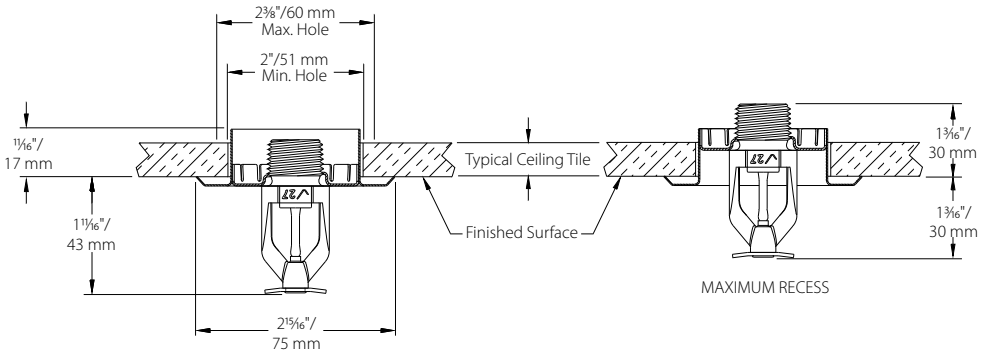
Dimensions:



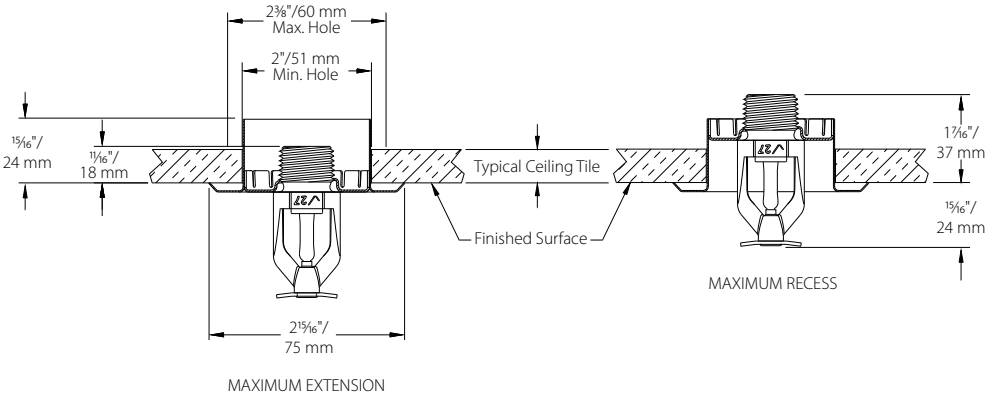
Standard Pendent –
V2707, V2708



Standard Upright –
V2703, V2704



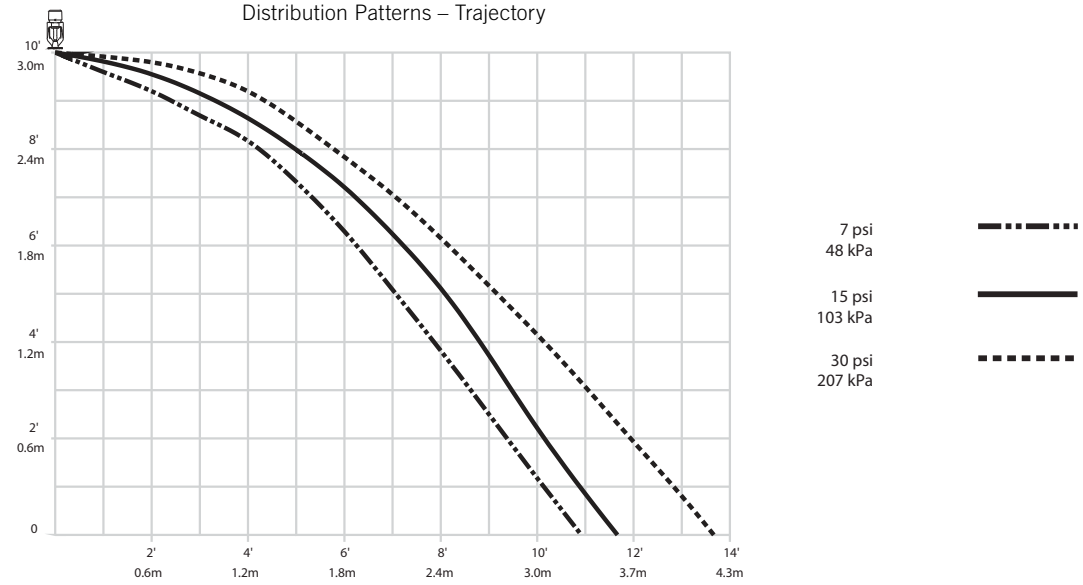
½" Adjustment Recessed – V2707, V2708 (drawing not to scale)



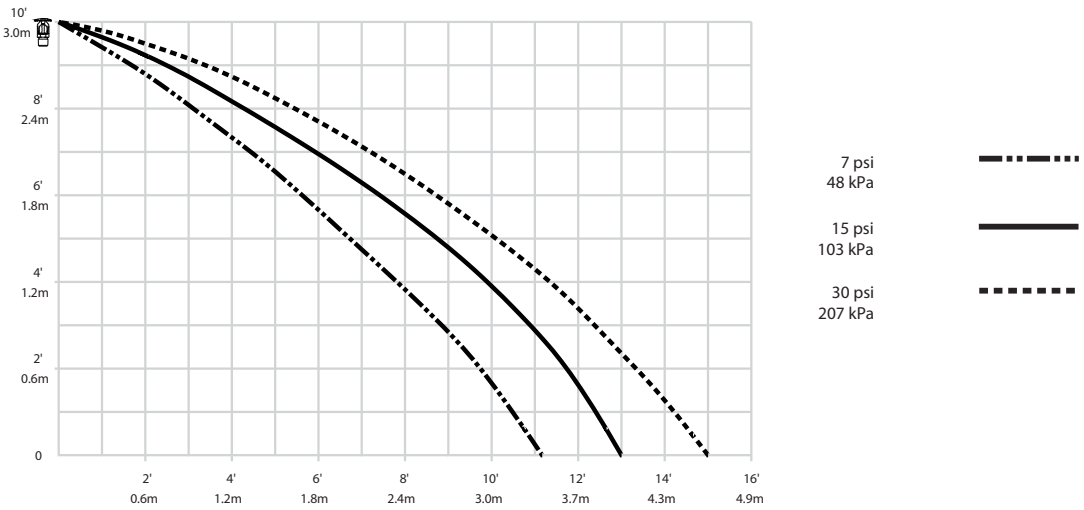
¾" Adjustment Recessed – V2707, V2708 (drawing not to scale)

Distribution Patterns:

Models V2707, V2708
K5.6 Standard Pendent and Recessed Pendent
Distribution Patterns – Trajectory



Models V2703, V2704
K5.6 Standard Upright
Distribution Patterns – Trajectory



NOTES:

A. Data shown is approximate and can vary due to differences in installation.

B. These graphs illustrate approximate trajectories, floor-wetting, and wall-wetting patterns for these specific Victaulic FireLock Automatic Sprinklers. They are provided as information for guidance in avoiding obstructions to sprinklers and should not be used as minimum sprinkler spacing rules for installation. **Refer to the appropriate NFPA National Fire Code or the Authority Having Jurisdiction for specific information regarding obstructions, spacing limitations and area of coverage requirements.** Failure to follow these guidelines could adversely affect the performance of the sprinkler and will void all Listings, Approvals and Warranties.

C. All patterns are symmetrical to the centerline of the waterway.

Ratings:

All glass bulbs are rated for temperatures from -67°F (-55°C) to those shown in the 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

[7] Standard response only.

[8] 150/65 if wax coated.

Available Wrenches:

	V27-2 Recessed	V27 Open End
V2707, V2708 Pendent	✓	✓
V2707, V2708 Recessed Pendent	✓	–
V2703, V2704 Upright	–	✓

⚠ 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.

Installation
Reference should always be made to the I-40 Victaulic FireLock Automatic Sprinklers Installation and Maintenance Sheet for the product you are installing. This installation sheet is included with each shipment of Victaulic products for complete installation and assembly data, and is available in PDF format on our website at victaulic.com.

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

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.

Trademarks
Victaulic is a registered trademark of Victaulic Company.

FOR UNDER READING NOOK

tyco Fire Protection Products

Worldwide Contacts | www.tyco-fire.com

RAVEN 5.6K Institutional Sprinklers Pendent and Horizontal Sidewall Quick Response, Standard and Extended Coverage

General Description

TYCO RAVEN 5.6K Institutional Pendent and Horizontal Sidewall (HSW) Sprinklers are quick response spray sprinklers designed for use in areas such as correctional, detention, and mental health care facilities as well as other commercial buildings. Both the pendent and horizontal sidewall styles are available for Standard Coverage (light and ordinary hazard) or Extended Coverage (light hazard) applications.

- The assembly is designed with tamper-resistant features to help prohibit a false activation.
- This sprinkler is designed to operate when the Inner Link (Ref. Figure 1) is removed manually. While the design of this sprinkler makes manual removal of the Inner Link less likely, this feature negates the possibility of a tampered sprinkler placed in a condition where it would not operate in the event of a fire due to prior part removal.
- This protected, unobtrusive design helps reduce the opportunity for individuals to injure themselves or others with piecemeal components of the sprinkler.
- The flush design is aesthetically appealing by concealing all operating parts.

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.

NOTICE

RAVEN Institutional Sprinklers described herein must be installed and maintained in compliance with this document and with the applicable standards of the National Fire Protection Association (NFPA), in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

TYCO Fire Protection Products (TFPP) specifically disclaims any liability for damages or injury (including death) arising out of or caused by manipulation, dismantling, or misuse of RAVEN Institutional Sprinklers or the use or attempted use of the RAVEN Institutional Sprinklers or any component thereof as an instrument unrelated to its intended function as a fire protection device.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

Sprinkler Identification Numbers (SINs)

SIN	DOT COLOR*	APPLICATION
TY3281	Black	Pendent Standard Coverage
TY3282	Green	Pendent Extended Coverage
TY3381	Red	HSW Standard Coverage
TY3382	Purple	HSW Extended Coverage

* Refer to Figures 1 through 4 for SIN Color Dot location.

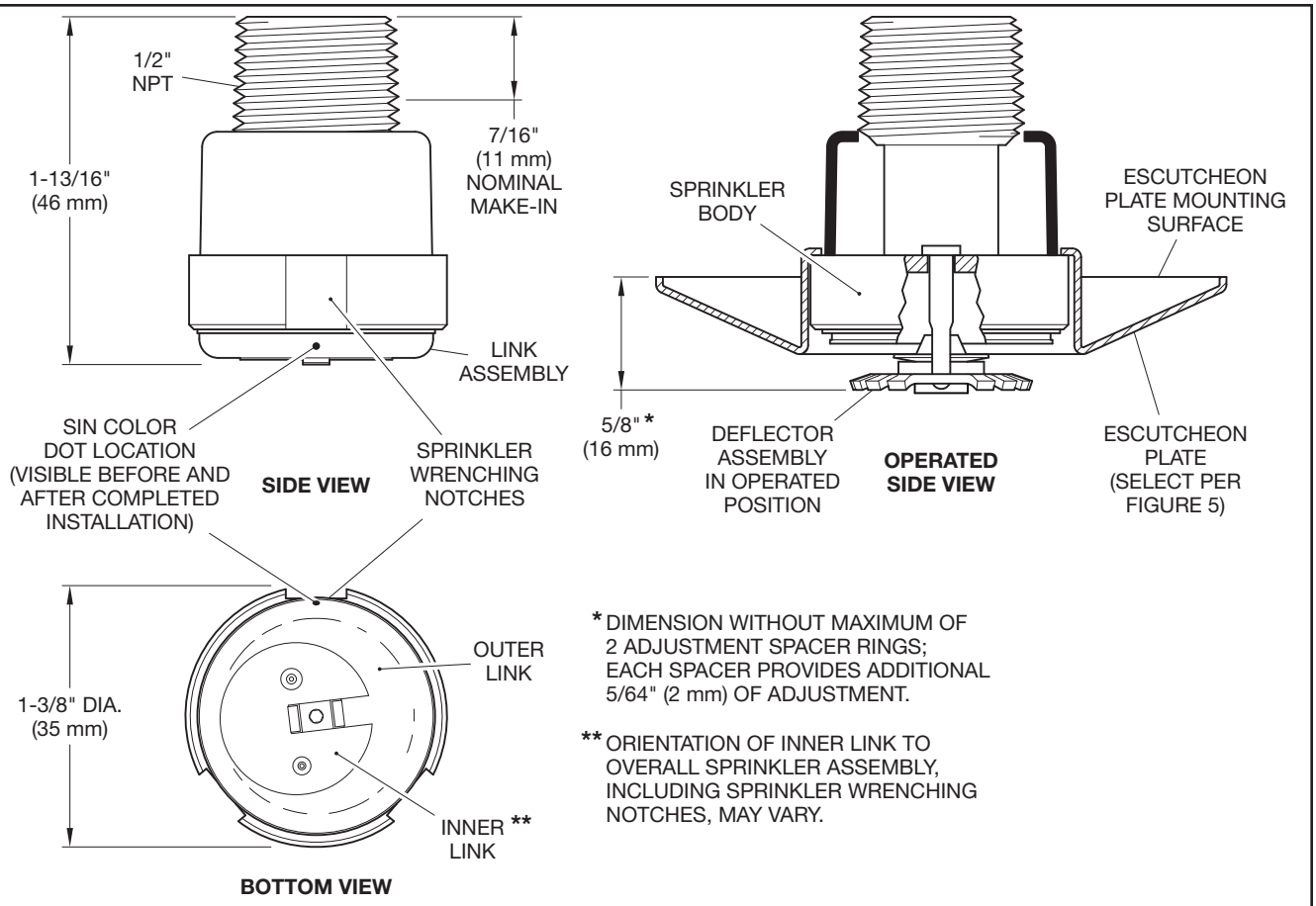


FIGURE 1
RAVEN INSTITUTIONAL PENDENT SPRINKLER
NOMINAL INSTALLATION DIMENSIONS

Technical Data

Approvals
UL and C-UL Listed

Maximum Working Pressure
175 psi (12,1 bar)

Inlet Thread Connection
1/2 inch NPT

Discharge Coefficient
K=5.6 gpm/psi$^{1/2}$ (80,6 lpm/bar$^{1/2}$)

Temperature Rating
165°F (74°C)

Finish
Sprinkler: White or Grey

Escutcheon: White, Grey, Chrome Coated (Carbon Steel only), or Electropolished* (Stainless Steel only)

Physical Characteristics

Body	Brass
Deflector Assembly	Bronze
Sealing Assembly	Beryllium Nickel w/TEFLON
Link Assembly	Copper
Escutcheon	Carbon Steel or Stainless Steel

* Chrome-coated appearance

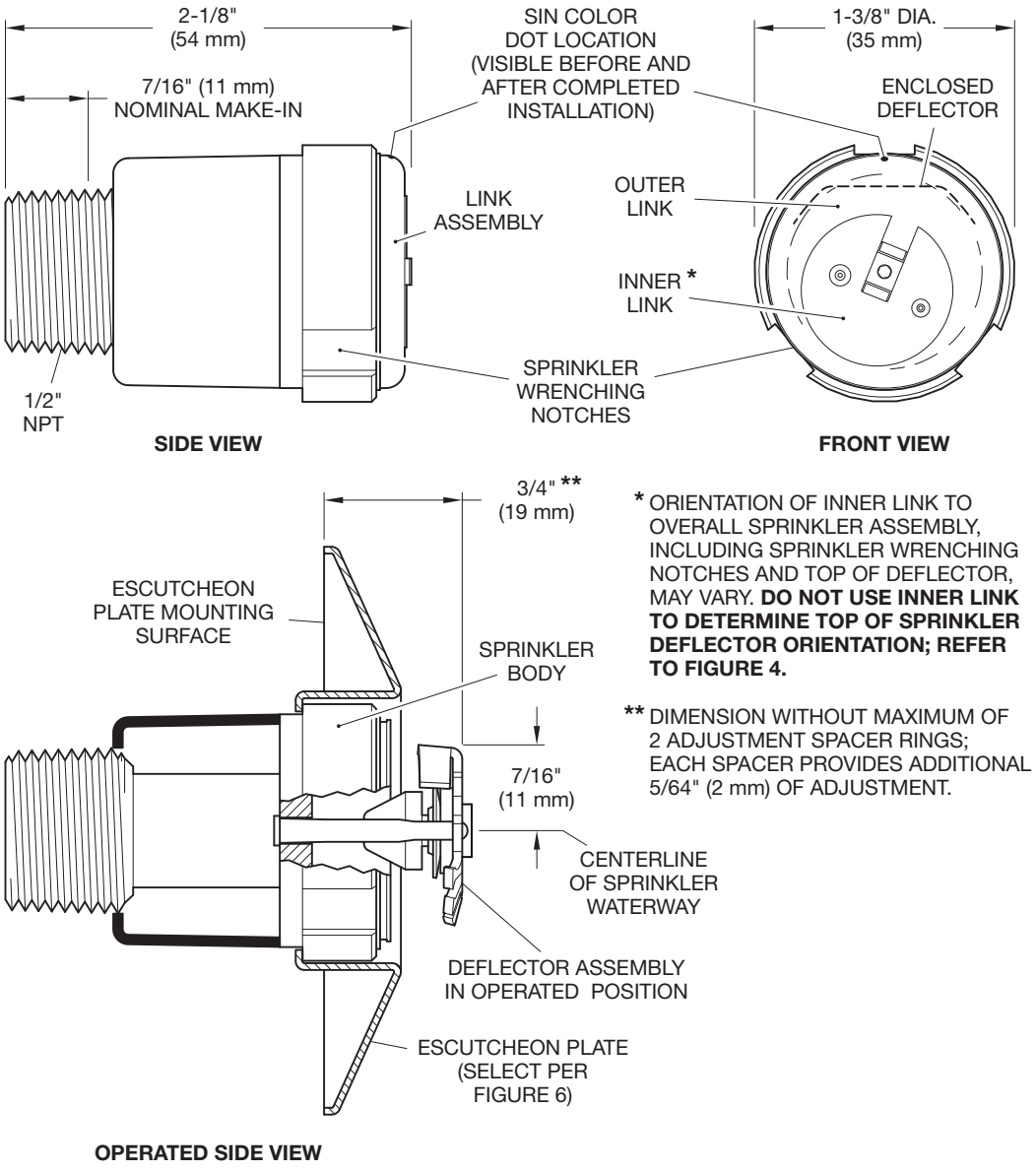
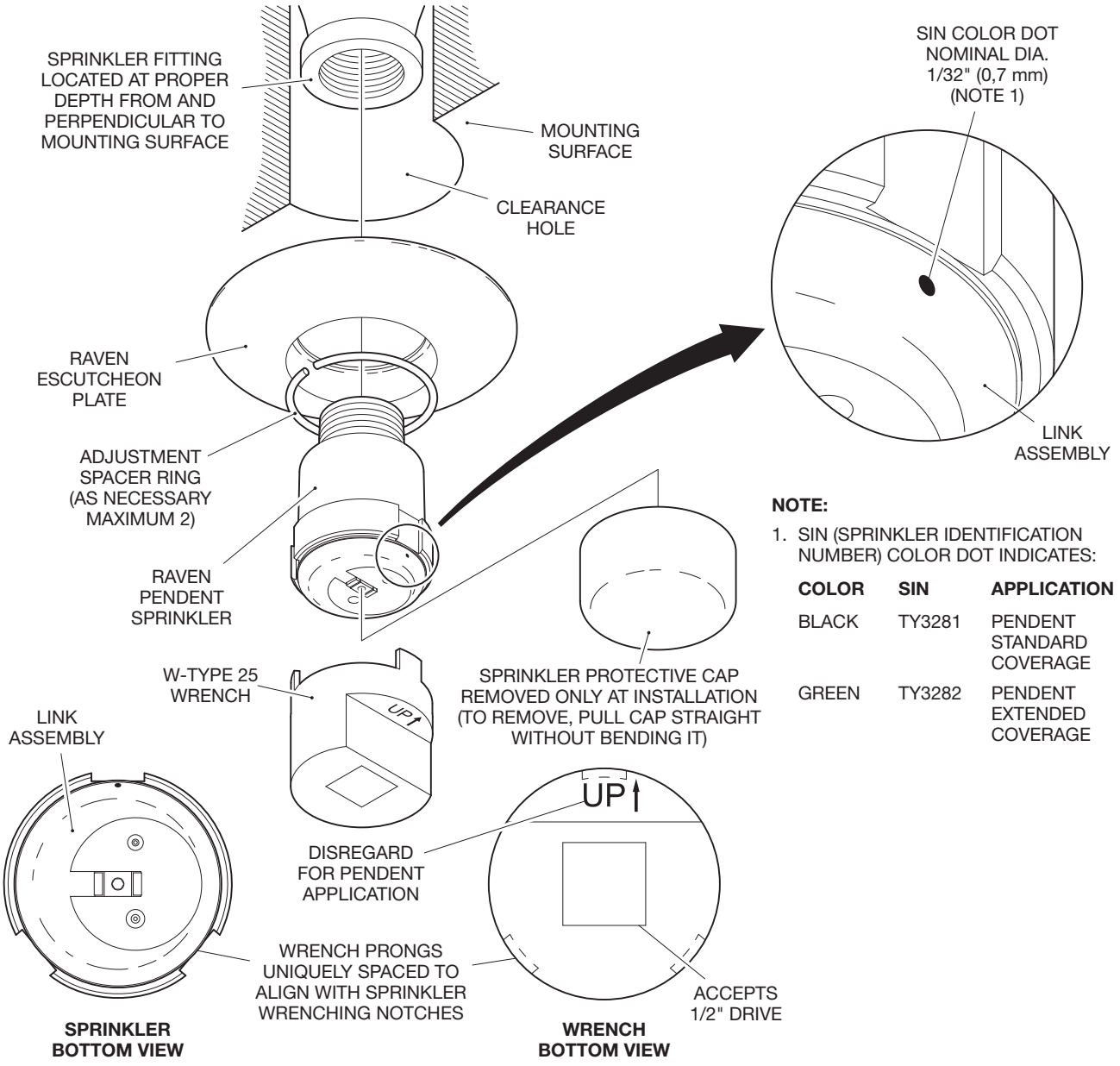


FIGURE 2
RAVEN INSTITUTIONAL HORIZONTAL SIDEWALL SPRINKLER
NOMINAL INSTALLATION DIMENSIONS

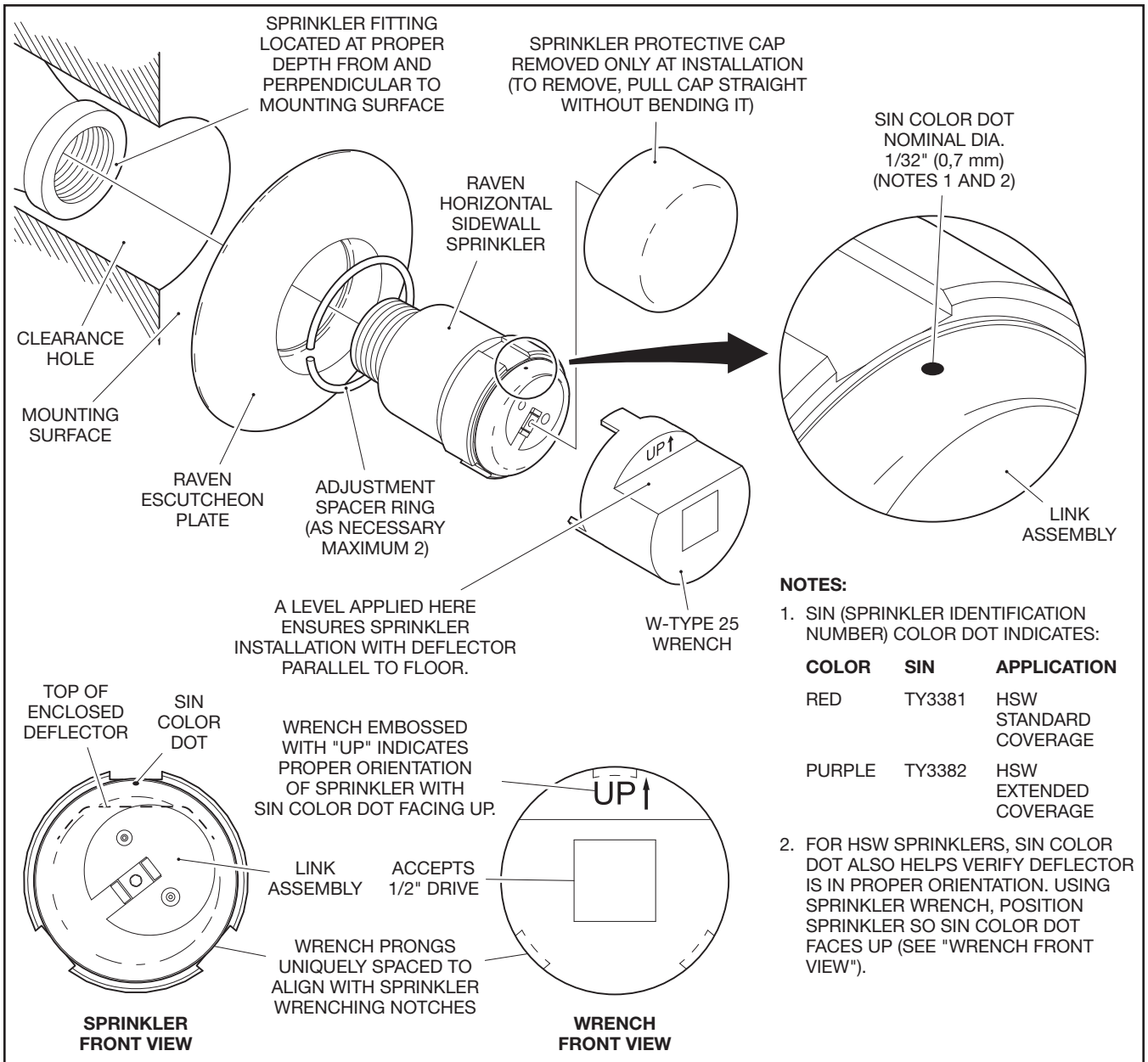


NOTE:

1. SIN (SPRINKLER IDENTIFICATION NUMBER) COLOR DOT INDICATES:

COLOR	SIN	APPLICATION
BLACK	TY3281	PENDENT STANDARD COVERAGE
GREEN	TY3282	PENDENT EXTENDED COVERAGE

FIGURE 3
RAVEN INSTITUTIONAL PENDENT SPRINKLER INSTALLATION WITH W-TYPE 25 SPRINKLER WRENCH



NOTES:

1. SIN (SPRINKLER IDENTIFICATION NUMBER) COLOR DOT INDICATES:

COLOR	SIN	APPLICATION
RED	TY3381	HSW STANDARD COVERAGE
PURPLE	TY3382	HSW EXTENDED COVERAGE

2. FOR HSW SPRINKLERS, SIN COLOR DOT ALSO HELPS VERIFY DEFLECTOR IS IN PROPER ORIENTATION. USING SPRINKLER WRENCH, POSITION SPRINKLER SO SIN COLOR DOT FACES UP (SEE "WRENCH FRONT VIEW").

FIGURE 4
RAVEN INSTITUTIONAL HORIZONTAL SIDEWALL SPRINKLER INSTALLATION WITH W-TYPE 25 SPRINKLER WRENCH

5.6K Extended Coverage Pendent (TY3282)						
Response Rating	**Coverage Area Ft. x Ft. (m x m)**	**Minimum Flow [1] gpm (lpm)**	**Minimum Pressure [2] psi (bar)**	**Deflector-to-Ceiling Distance Inches (mm)**	**Sprinkler Temperature Rating °F (°C)**	**Minimum Spacing Ft. (m)**
Quick	16 x 16 (4,9 x 4,9)	26 (98)	21.6 (1,49)	Flush Mounted	165 (74)	8 (2,4)
5.6K Extended Coverage Horizontal Sidewall (TY3382)						
Response Rating	**Coverage Area Ft. x Ft. (m x m)**	**Minimum Flow [1] gpm (lpm)**	**Minimum Pressure [2] psi (bar)**	**Deflector-to-Ceiling Distance [3] Inches (mm)**	**Sprinkler Temperature Rating °F (°C)**	**Lateral Minimum Spacing [4] Ft. (m)**
Quick	16 x 16 (4,9 x 4,9)	26 (98)	21.6 (1,49)	4 to 12 (100 to 300)	165 (74)	8 (2,4)

Notes:
1. Requirement is based on minimum flow in gpm (lpm) from each sprinkler.
2. Indicated residual pressures are based on the nominal K-factor.
3. Centerline of the sprinkler waterway is located 7/16 inch (11,1 mm) below the deflector (Ref. Figure 7).
4. Minimum spacing is for lateral distance between sprinklers located along a single wall. Otherwise adjacent sprinklers (i.e., sidewall sprinklers on an adjacent wall, on an opposite wall, or pendent sprinklers) must be located outside of the maximum listed protection area of the extended coverage sidewall sprinkler being utilized.

TABLE A
RAVEN INSTITUTIONAL SPRINKLERS
UL AND C-UL LISTING EXTENDED COVERAGE AND FLOW RATE CRITERIA

Design Criteria

General Criteria
Only escutcheons shown in Figures 5 and 6 can be utilized with TYCO RAVEN 5.6K Institutional Pendent and Horizontal Sidewall Sprinklers. A maximum of two spacers can be used to adjust the escutcheons.

NOTICE

Use of more than two spacers may result in disabling the tamper-resistant design of TYCO RAVEN Institutional Sprinklers and, thereby, also disable its principle functions of helping to avoid false sprinkler operations and avoid the opportunity for individuals to injure themselves or others with components of the sprinkler.

Standard Coverage Criteria
RAVEN Standard Coverage, Institutional Pendent and Horizontal Sidewall Sprinklers (TY3281 and TY3381) are intended for use with fire protection systems designed in accordance with the standard installation rules recognized by the applicable listing or approval agency (e.g., UL Listing is based on NFPA 13 requirements).

RAVEN Horizontal Sidewall Sprinklers (TY3381) must be installed with a deflector-to-ceiling distance of 4 to 12 inches (100 to 300 mm). To meet this requirement, the centerline of the sprinkler waterway must be located 4-7/16 to 12-7/16 inches (112,7 to 315,9 mm) below the ceiling (Ref. Figure 7).

Extended Coverage Criteria
RAVEN Extended Coverage, Institutional Pendent and Horizontal Sidewall Sprinklers (TY3282 and TY3382) must be installed in accordance with the flow rate criteria provided in Table A. They must be installed and utilized in light hazard occupancies under smooth, flat, horizontal ceilings as outlined in the applicable installation standard recognized by the listing or approval agency (e.g., UL Listing is based on NFPA 13 requirements).

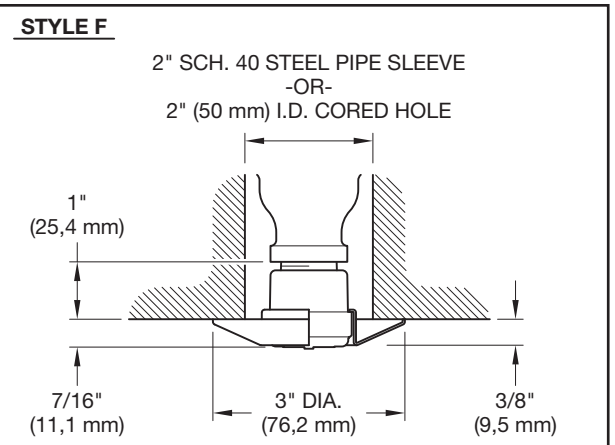
RAVEN Extended Coverage, Horizontal Sidewall Sprinklers (TY3382) must be installed with a deflector-to-ceiling distance of 4 to 12 inches (100 to 300 mm). To meet this requirement, the centerline of the sprinkler waterway must be located 4-7/16 to 12-7/16 inches (112,7 to 315,9 mm) below the ceiling (Ref. Figure 7).

Operation

In standby condition, the unique assembly of RAVEN Institutional Pendent and Horizontal Sidewall Sprinklers is designed with tamper-resistant features to help prohibit a false activation and help reduce the opportunity for individuals to injure themselves or others with components of a fire sprinkler. RAVEN Institutional Sprinklers are specifically designed to minimize components, as well as holes or shapes, that could provide a point for securing an external non-sprinkler associated object. Also, when properly installed, the escutcheon is held fast to the ceiling or wall to deter its removal. The shape of the sprinkler and escutcheon cannot be grasped easily, which further deters tampering.

For information on the break-away load of RAVEN Institutional Sprinklers, contact Technical Services.

A link assembly covers the sealing assembly. The link is soldered with an eutectic solder that melts when exposed to heat. When the link reaches its rated temperature, the link separates and releases the sealing assembly, allowing the deflector assembly to extend from the body and water to flow.



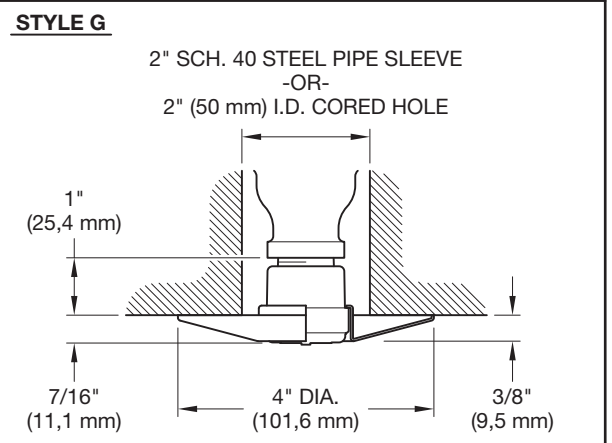
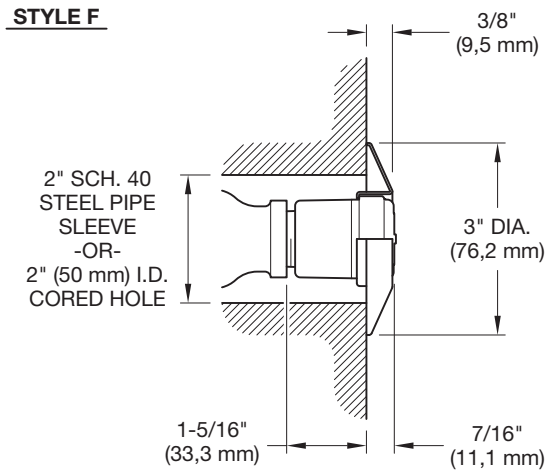


FIGURE 5
RAVEN INSTITUTIONAL PENDENT SPRINKLER ESCUTCHEON OPTIONS



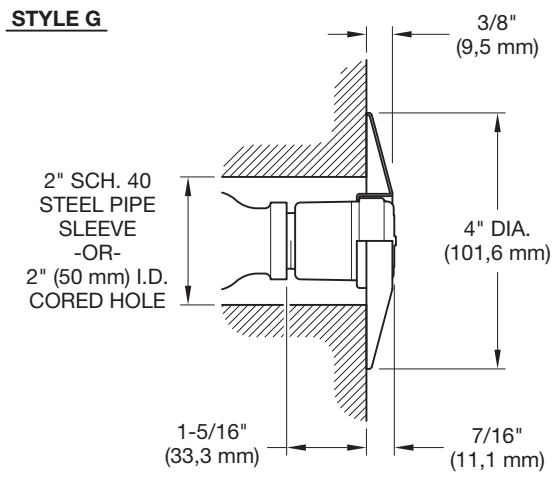


FIGURE 6
RAVEN INSTITUTIONAL HSW SPRINKLER ESCUTCHEON OPTIONS

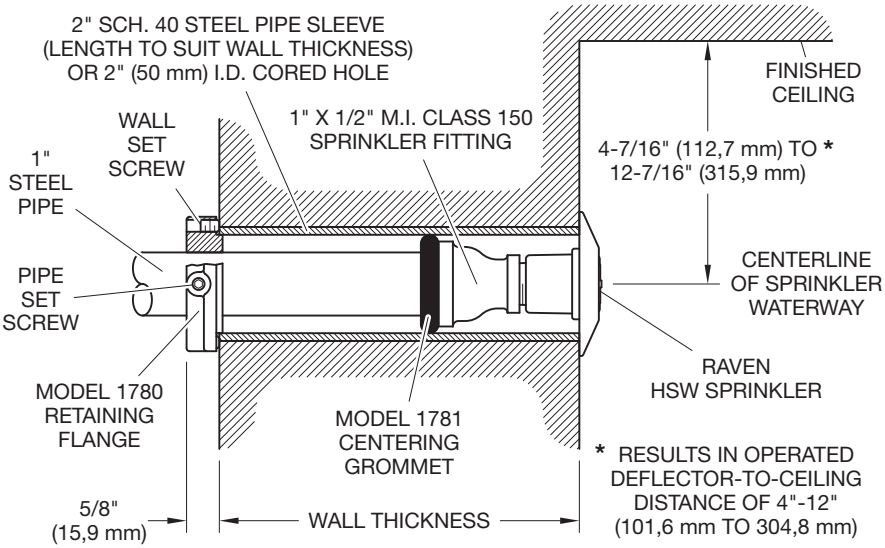


FIGURE 7
MODEL 1780 RETAINING FLANGE AND MODEL 1781 CENTERING GROMMET HORIZONTAL INSTALLATION FOR PENDENT

Installation

TYCO RAVEN 5.6K Institutional Pendent and Horizontal Sidewall Sprinklers must be installed in accordance with this section.

General Instructions
Integrity of the tamper-resistant design of RAVEN Escutcheons is dependent on the piping installation design. When installed properly, the escutcheon is held fast (i.e., tight with no movement or gap) to the mounting surface (ceiling or wall, as applicable) by tightening the sprinkler assembly into the sprinkler fitting. Be careful not to create too much force between the escutcheon and wall, as extensive force may cause issues with the pulling of the sprinkler body from the stem, possibly causing warping, cracks, and leaks.

A tamper-resistant installation requires all of the following:

- The sprinkler fitting must be properly located with respect to distance from the face of the sprinkler fitting to the face of the mounting surface (Ref. Figures 5 & 6).
- The sprinkler fitting must be rigidly secured and immobile through the use of the retaining flange, installed flush to the back of the wall or above the ceiling and secured with the pipe set screws.
- The centerline of the sprinkler fitting must be perpendicular to the mounting surface to assure that the Institutional Escutcheon sits squarely against the mounting surface around its entire perimeter.

Figure 7 illustrates a technique to adjust the location of the sprinkler fitting to help assure immobility of the sprinkler fitting and to help maintain perpendicularity of the sprinkler fitting to the mounting surface.

While Figure 7 illustrates a horizontal installation, it can be applied to pendent installations.

When applied, the technique shown in Figure 7 allows the sprinkler/supply pipe to be pulled back into the mounting surface from behind the wall or above the ceiling, and the retaining flange set flush to the back of the wall or above the ceiling and secured with the retaining flange pipe set screws. This technique will help overcome problems with assuring that the escutcheon is held fast to the mounting surface (i.e., tight with no movement or gap).

It is recommended that flexible sprinkler piping is used to connect the sprinkler pipe to the supply piping to maximize installation flexibility and to ensure that the sprinkler and the escutcheon are installed properly, as shown in Figure 7.

A 1/2 inch NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 7 to 14 lbs.-ft. (9,5 to 19,0 Nm). Higher levels of torque may damage the sprinkler with consequent leakage or impairment of the sprinkler. Rather than over-torquing to meet proper orientation for the horizontal sidewall sprinkler, stop tightening earlier.

Do not attempt to compensate for improper location of the sprinkler fitting by under- or over-tightening the sprinkler.

After installation is complete, ensure the RAVEN Escutcheon is held fast (i.e., tight with no movement or gap) to the mounting surface and that the escutcheon sits squarely against the mounting surface around its entire perimeter.

The following tools are recommended for proper installation of RAVEN Institutional Sprinklers:

- TEFLON tape
- TYCO W-Type 25 Installation Wrench
- 1/2 inch drive ratchet wrench
- Torque wrenches
- Ratchet extension (optional)
- Level

NOTICE

Install RAVEN Pendent Sprinklers with the centerline of the waterway perpendicular to the ceiling. Install RAVEN Horizontal Sidewall sprinklers with the centerline of their waterway parallel with the ceiling and perpendicular to the back wall.

Step 1. Inspect the sprinkler for any visible signs of damage that could have occurred during shipping or handling.

Apply a non-hardening pipe-thread sealant such as TEFLON tape to the NPT thread of the sprinkler. Applying between two (2) and four (4) full wraps of tape is recommended.

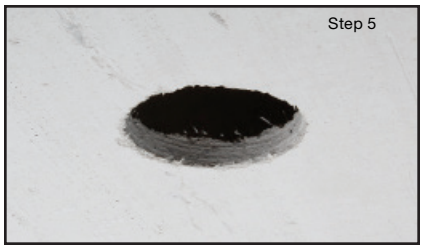
Carefully remove the orange protective cap from the sprinkler by pulling it straight out without bending it.

Verify that the sprinkler identification number (SIN) and temperature rating located on the side of the sprinkler match installation requirements.

Step 2. Align the TYCO W-Type 25 Installation Wrench with the sprinkler. The flat surface should be in line with the small colored dot on the sprinkler.

Step 3. Ensure that the TYCO W-Type 25 Installation Wrench is fully engaged onto the sprinkler. Fully insert all three Wrench Prongs into the slots on the sprinkler body.

Step 4. With the Wrench on the sprinkler, place the escutcheon over the sprinkler.

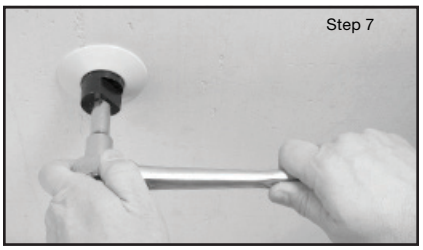


Step 5. Ensure that the ceiling/wall is smooth for the escutcheon to sit against and that the distance from the ceiling/wall surface to the sprinkler fitting is appropriate. As shown in Figures 5 and 6, the take-out dimensions are 1 inch for pendent sprinklers and 1-5/16 inches for horizontal sidewall sprinklers.

NOTICE

The sprinkler has intentionally been designed to be difficult to grasp by hand. Therefore, the use of the W-Type 25 Installation Wrench for hand-tightening assists in threading the sprinkler. Also, use of the W-Type 25 Installation Wrench helps avoid damage to the sprinkler during installation.

Step 6. With the escutcheon in place and with pipe-thread sealant applied to the pipe threads, hand-tighten the sprinkler into the sprinkler fitting using the TYCO W-Type 25 Installation Wrench with the wrench prongs fully engaged with the sprinkler wrenching notches. The wrench prongs are designed to engage the wrenching notches in the sprinkler body, and are also uniquely spaced to align with the sprinkler wrenching notches in one position.



Step 7. Wrench-tighten the sprinkler using only the TYCO W-Type 25 Installation Wrench (Ref. Figure 3).

Insert a 1/2 inch drive ratchet wrench (with or without the extension) into the TYCO W-Type 25 Installation Wrench. Ensure the ratchet wrench remains parallel to the ceiling/wall. A ratchet extension can help to keep the wrench in line with the sprinkler. Torque for the RAVEN Institutional Sprinkler is 7 to 14 lbs.-ft.

NOTICE

To help prevent slippage of the wrench and while using a 1/2 inch drive ratchet wrench, place one hand over the TYCO W-Type 25 Installation Wrench while tightening with the other hand.

A recommended technique to determine if the torque range is achieved involves the use of two different torque wrenches. Adjust first with a 7 ft.-lbs. torque wrench, followed by adjusting with a 14 ft.-lbs. wrench.

Step 8. For horizontal sidewall sprinklers, a Level can be placed on top of the flat surface of the TYCO W-Type 25 Installation Wrench to orient the sprinkler correctly.

Step 9. After installation is complete, ensure that the RAVEN Escutcheon is held fast against the mounting surface and sits squarely against the ceiling around its entire perimeter.

When applied, the technique shown in Figure 7 allows the sprinkler/supply pipe to be pulled back into the mounting surface from behind the wall or above the ceiling, and the retaining flange set flush to the back of the wall or above the ceiling and secured with the retaining flange pipe set screws. Do not over-tighten the wall set screws, as over-tightening these screws may damage the sprinkler.

To verify correct sprinkler application, refer to the Notes in Figures 3 and 4 on SIN color dot indicators.

For horizontal sidewall sprinklers, the SIN color dot also helps verify deflector orientation. In proper installations of RAVEN Horizontal Sidewall Sprinklers, SIN color dots face up.

NOTICE

If the escutcheon is not held fast (i.e., tight with no movement or gap) to the mounting surface and as an option to relocating the sprinkler fitting (increasing the face-of-fitting to face-of-mounting surface distance), up to two (2) Adjustment Spacer Rings as shown in Figure 3 may be utilized. Each Adjustment Spacer Ring can account for 0.075 inches of gap between the escutcheon and mounting surface. Therefore, if the gap is greater than 0.150 inches, the sprinkler fitting will need to be relocated to assure proper installation of both the sprinkler and escutcheon.

Care and Maintenance

TYCO RAVEN 5.6K Institutional Pendent and Horizontal Sidewall Sprinklers 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 system from the proper authorities and notify all personnel who may be affected by this action.

Service inspections should be made on a regular basis to detect possible damage or alterations to the sprinkler and escutcheon. Inspections should include making certain that the RAVEN Institutional Escutcheon is held fast to the mounting surface. Damaged or altered sprinklers are to be replaced immediately to avoid personal injury and to prevent use for causing personal injury, as well as to maintain the sprinkler system in an operative condition.

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).

Frequent visual inspections are recommended to be initially performed for sprinklers installed in potentially corrosive atmospheres to verify the integrity of the materials of construction as they may be affected by the corrosive conditions present for a given installation. Thereafter, annual inspections per NFPA 25 are required.

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 product manufacturer regarding any questions.

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

Limited Warranty

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

Disclaimer for RAVEN Institutional Sprinklers

TYCO Fire Protection Products specifically disclaims any liability for damages or injury (including death) arising out of or caused by manipulation, dismantling, or misuse of RAVEN Institutional Sprinklers or the use or attempted use of the RAVEN Institutional Sprinklers or any component thereof as an instrument unrelated to its intended function as a fire protection device.

Ordering Procedure

Contact your local distributor for availability. When placing an order, indicate the full product description and part number (P/N).

Sprinkler Assemblies
Specify: RAVEN (Standard or Extended Coverage), 165°F (74°C), Institutional (Pendent or Horizontal Sidewall) Sprinkler with (specify) Finish, and P/N (specify):

Standard Coverage Pendent (TY3281)
White . . . . . P/N 50-314-4-165
Grey . . . . . P/N 50-314-9-165

Standard Coverage HSW (TY3381)
White . . . . . P/N 50-316-4-165
Grey . . . . . P/N 50-316-9-165

Extended Coverage Pendent (TY3282)
White . . . . . P/N 50-315-4-165
Grey . . . . . P/N 50-315-9-165

Extended Coverage HSW (TY3382)
White . . . . . P/N 50-317-4-165
Grey . . . . . P/N 50-317-9-165

Separately Ordered Escutcheons Style F (3” Diameter)

Carbon Steel
White . . . . . P/N 56-314-4-010
Grey . . . . . P/N 56-314-7- 010
Chrome Coated . . . . . P/N 56-314-9-010

Stainless Steel
White . . . . . P/N 56-318-4-010
Grey . . . . . P/N 56-318-7- 010
Electropolished*. . . . . P/N 56-318-9-010

Separately Ordered Escutcheons Style G (4” Diameter)

Carbon Steel
White . . . . . P/N 56-312-4-010
Grey . . . . . P/N 56-312-7- 010
Chrome Coated . . . . . P/N 56-312-9-010

Stainless Steel
White . . . . . P/N 56-319-4-010
Grey . . . . . P/N 56-319-7- 010
Electropolished*. . . . . P/N 56-319-9-010

* Chrome-coated appearance

Separately Ordered Sprinkler Wrench
Specify: W-Type 25 Installation Wrench, P/N 56-314-1-001

Separately Ordered Parts for Installation in Concrete
Specify: Model 1781 Centering Grommet for installation in concrete, P/N 56-000-1-781

Specify: Model 1780 Retaining Flange with Set Screws for installation in concrete, P/N 56-000-1-780

Separately Ordered Adjustment Spacer Ring
Specify: Adjustment Spacer Ring for use with RAVEN Institutional Sprinklers, P/N 56-000-1-755

tyco Fire Protection Products

Victaulic® Vic-Flex™ Sprinkler Fittings
Series AH1 and AH1-CC Braided Flexible Hose

10.95

1.0 PRODUCT DESCRIPTION

Available Sizes by Component

- **Series AH1 Braided Hose:** 31, 36, 48, 60, 72"/790, 914, 1220, 1525, 1830 mm. Note: length includes adapter nipple and 5.75"/140 mm straight reducer.
- **Series AH1-CC Braided Hose:** 31, 36, 48, 60, 72"/790, 914, 1219, 1525, 1830 mm. Note: length includes captured coupling and 5.75"/140 mm straight reducer.
- **Sprinkler Reducers**:
  - **Sprinkler Connections:** ½ and ¾"/15 and 20mm
  - **Straight Lengths:** 5.75, 9, 13"/140, 230, 330 mm
  - **90° Elbows:**
    - Short (typically used with concealed sprinklers)
    - Long (typically used with recessed pendent sprinklers)
    - Low Profile Short (for use with Style AB5, AB11 and AB12 Bracket)
    - Low Profile Long (for use with Style AB5, AB11 and AB12 Bracket)
- **Inlet Connections:**
  - 1"/25 mm Grooved IGS
  - 1"/25 mm NPT or BSPT adapter nipples for attaching to pipe and fittings outlined in NFPA standards.
  - ¾"/20 mm NPT or BSPT adapter nipples available for VdS.
  - 1 ¼"/ 32mm BSPT adapter nipples available for LPCB.

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

System No.		Location		Spec Section		Paragraph	
Submitted By		Date		Approved		Date	

1.0 PRODUCT DESCRIPTION (Continued)

- **Brackets:**
  - Style AB1 for suspended and hard-lid ceilings, allows installation before most ceiling tiles in place
  - Style AB2 for suspended and hard-lid ceilings, allows for vertical sprinkler adjustment, and installation before most ceiling tiles in place
  - Style AB3 for surface mount applications, wood, metal and block walls or ceilings
  - Style AB4 for hard-lid ceilings with hat furr ing channel grid systems, allows for vertical sprinkler adjustment
  - Style AB5 for hard-lid ceilings, allows for vertical sprinkler adjustment
  - Style AB7 for suspended and hard-lid ceilings
  - Style AB7 Adjustable for suspended and hard-lid ceilings
  - Style AB8 for hard-lid ceilings with CD 60/27 profile metal studs (regionally available)
  - Style AB10 for Armstrong® TechZone™ ceilings
  - Style AB11 for lay-in panel suspended t-grid ceilings or drywall suspended t-grid ceilings, allows for low profile installations (use only with 90° low profile elbows)
  - Style AB12 for suspended and hard-lid ceilings, allows for vertical sprinkler adjustment, and allows for low profile installation down to 4"/100mm

Maximum Working Temperature

- 225°F/107°C

Maximum Working Pressure

- 200 psi/1375 kPa (FM Approval)
- 175 psi/1206 kPa (cULus Listed)
- 1600 kPa/232 psi (VdS/LPCB Approved)
- 1.4 MPa (CCCf Approval)

Connections

- To adapter nipple (inlet) via
  - 1"/25.4 mm Grooved IGS
  - 1"/25.4 mm NPT or BSPT male thread
  - ¾"/20 mm BSPT male thread (VdS only)
  - 1 ¼"/32 mm BSPT male thread (LPCB only)
- To sprinkler head (outlet) via ½" or ¾"/15 mm or 20 mm

Minimum Bend Radius

- 7"/178 mm (FM /CCCf Approval)
- 3"/76.2 mm (cULus Listed)
- 3"/76.2 mm (VdS/LPCB Approved)

Maximum Allowable Sprinkler K-Factors

- FM (½"/15mm reducer) K5.6/8,1 (S.I.), (¾"/20mm reducer) K14.0/20,2 (S.I.)
- cULus (½"/15mm reducer) K8.0/11,5 (S.I.), (¾"/20mm reducer) K14.0/20,2 (S.I.)
- VdS/LPCB (½"/15mm reducer) K5.6/8,1 (S.I.), (¾"/20mm reducer) K8.0/11,5 (S.I.)

2.0 CERTIFICATION/LISTINGS

3.0 SPECIFICATIONS – MATERIAL

Series AH1

- **Flexible Hose:** 300-series Stainless Steel
- **Collar/Weld Fitting:** 300-series Stainless Steel
- **Gasket Seal:** Victaulic EPDM
- **Isolation Ring:** Nylon
- **Nut and Nipple:** Carbon Steel, Zinc Plated
- **Reducer (½ or ¾"):** Carbon Steel, Zinc-Plated

Brackets: Carbon Steel, Zinc-Plated

Series AH1-CC

- **Flexible Hose:** 300-series Stainless Steel
- **Collar/Weld Fitting:** 300-series Stainless Steel
- **Gasket Seal:** Victaulic EPDM
- **Isolation Ring:** Nylon
- **Coupling Retainer Ring:** Polyethelene
- **Nut and Nipple:** Carbon Steel, Zinc Plated
- **Reducer (½"/15 mm or ¾"/20 mm):** Carbon Steel, Zinc-Plated
- **Housing:** Ductile iron conforming to ASTM A 536, Grade 65-45-12. Ductile iron conforming to ASTM A 395, Grade 65-45-15, is available upon special request.

  Coupling Housing Coating:

  - Orange enamel (North America, Asia Pacific).
  - Red enamel (Europe).
  - Hot dipped galvanized.

  Gasket:[1]

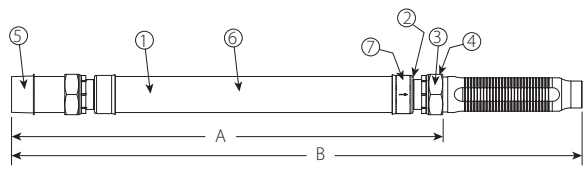
  - **Grade "E" EPDM (Type A)**
    FireLock EZ products have been Listed by Underwriters Laboratories Inc., Underwriters Laboratories of Canada Limited, and Approved by Factory Mutual Research for wet and dry (oil free air) sprinkler services within the rated working pressure.

    [1] Services listed are General Service Guidelines only. It should be noted that there are services for which these gaskets are not compatible. Reference should always be made to the latest Victaulic Gasket Selection Guide ffor specific gasket service guidelines and for a listing of services which are not compatible.

- **Bolts/Nut:** Zinc electroplated carbon steel, trackhead meeting the physical and chemical requirements of ASTM A 449 and physical requirements of ASTM A 183.
- **Linkage:** CrMo Alloy Steel zinc electroplated per ASTM B633 Zn/Fe 5, Type III Finish.

4.0 DIMENSIONS

Product Details - Series AH1 Braided Hose

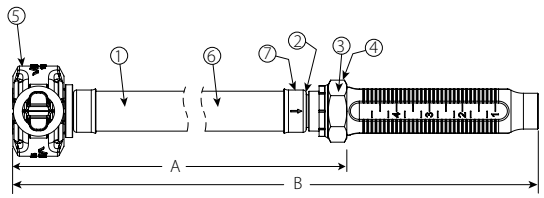


Item	Description
1	Flexible Hose
2	Isolation Ring
3	Gasket
4	Nut
5	Branch Line Nipple
6	Braid
7	Collar/Weld Fitting

Hose Length Dimensions

Hose Length inches mm	A inches mm	B inches mm
31/790	25.25/641	31/790
36/915	31.25/794	36/915
48/1220	42.25/1073	48/1220
60/1525	54.25/1378	60/1525
72/1830	66.25/1683	72/1830

Series AH1-CC



Item	Description
1	Flexible Hose
2	Isolation Ring
3	Gasket
4	Nut
5	Style 108 Coupling
6	Braid
7	Collar/Weld Fitting

Hose Length Dimensions

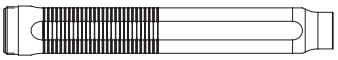
Hose Length inches mm	A inches mm	B inches mm
31/790	24.5/622	29.8/757
36/915	29.5/749	34.8/884
48/1220	41.5/1054	46.8/1189
60/1525	53.5/1359	58.8/1494
72/1830	65.5/1664	70.8/1798

4.0 DIMENSIONS (continued)

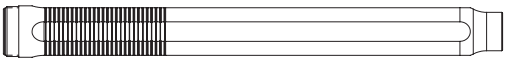
Standard Reducer

5.75"/140 mm straight reducer

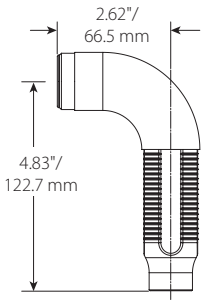
Optional Reducers



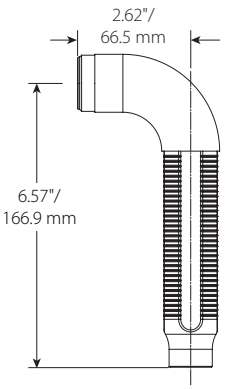
9.0"/229 mm straight reducer



13.0"/330 mm straight reducer



Short 90° elbow reducer

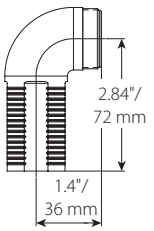


Long 90° elbow reducer

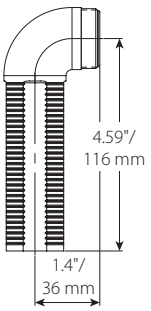
NOTE

- The Short 90° elbow reducer is typically used with concealed sprinklers while the longer 90 elbow is typically used in the installation of recessed pendent sprinklers.
- FM/VdS Approved Only.

Low Profile



Short 90° elbow reducer



Long 90° elbow reducer

NOTE

- Style AB11: When low profiles elbows are used with the Style AB11 bracket, the Low Profile Short Elbow is typically used with concealed sprinklers while the Low Profile Long Elbow is typically used in the installation of recessed pendent sprinklers.

4.1 DIMENSIONS

VicFlex Brackets

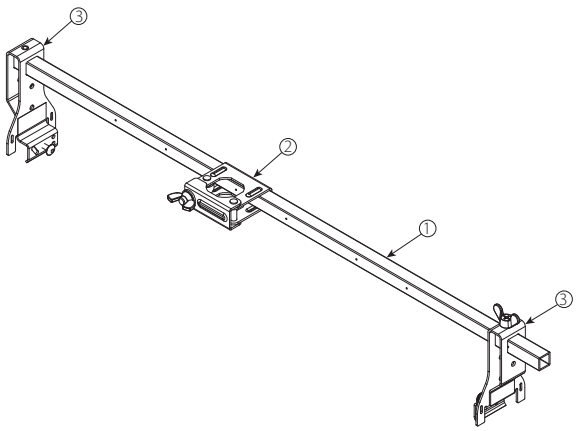
Style AB1

- Suspended Ceilings
- Hard-Lid Ceilings (FM Only)

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented Center Bracket
3	End Bracket

NOTE

- Both sizes FM/VdS/LPCB approved, cULus listed



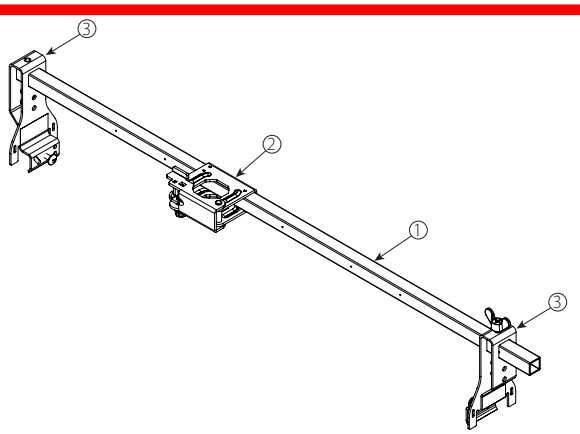
Style AB2

- Suspended Ceilings
- Hard-Lid Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented Vertically Adjustable Center Bracket
3	End Bracket

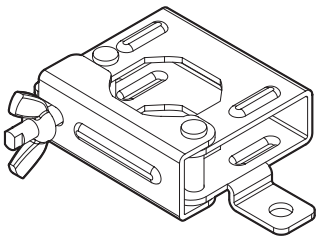
NOTE

- Both sizes FM/VdS/LPCB approved, cULus listed



Style AB3

- Surface Mount Applications
- FM/LPCB Approved



4.2 DIMENSIONS

VicFlex Brackets

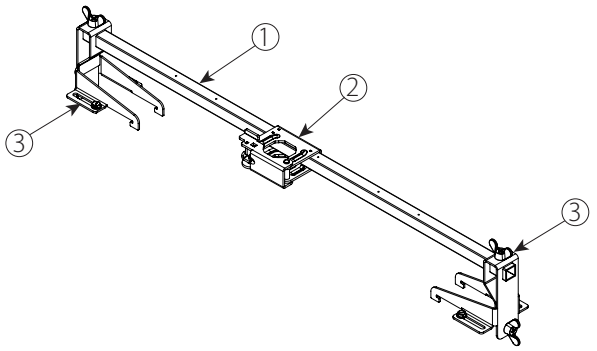
Style AB4

- Hard-Lid Ceilings with Hat furring channel grid system

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented Vertically Adjustable Center Bracket
3	End Bracket for Hat Furring Channel

NOTE

- Both sizes FM/VdS/LPCB approved, cULus listed



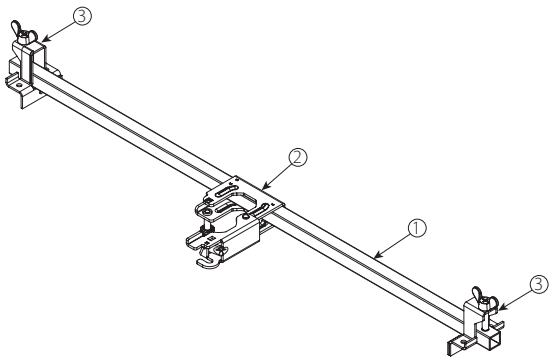
Style AB5

- Hard-Lid Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented Vertically Adjustable Center Bracket
3	End Bracket

NOTE

- Both sizes FM/VdS/LPCB approved, cULus listed



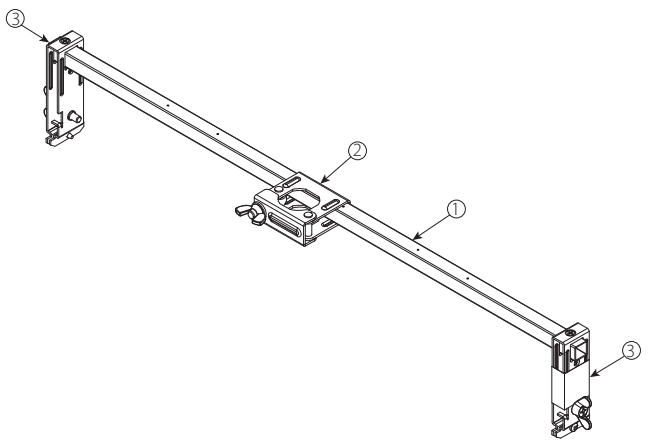
Style AB7

- Suspended Ceilings
- Hard-Lid Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented 1-Bee2® Center Bracket
3	End Bracket

NOTE

- Both sizes FM/VdS/LPCB approved.



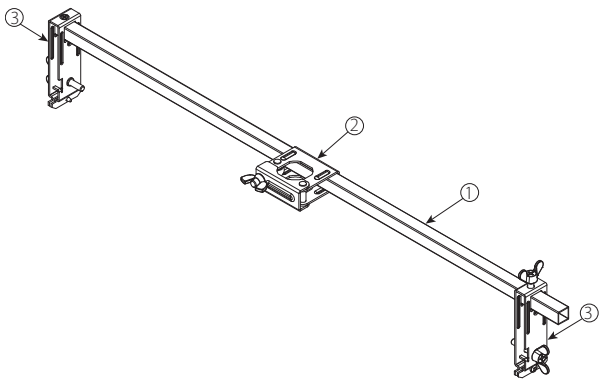
Style AB7 Adjustable

- Suspended Ceilings
- Hard-Lid Ceilings

Item	Description
1	700 mm or 1400 mm Square Bar
2	Patented 1-Bee2® Center Bracket
3	End Bracket (adjustable)

NOTE

- Both sizes FM/VdS/LPCB approved.



4.3 DIMENSIONS

VicFlex Brackets

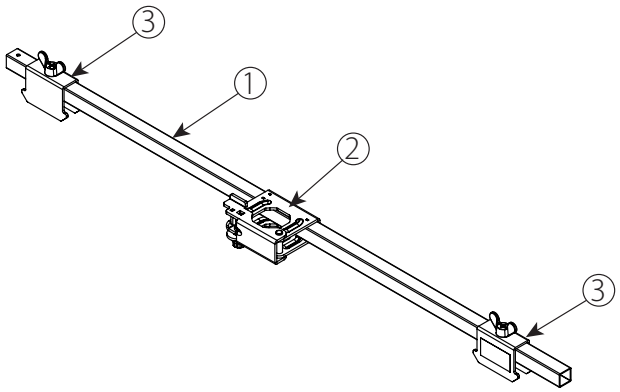
Style AB8

- Hard-Lid Ceilings

Item	Description
1	700 mm or 1400 mm Square Bar*
2	Patented Vertically Adjustable Center Bracket
3	*Both sizes FM/VdS

NOTE

- Both sizes FM/VdS/LPCB approved.



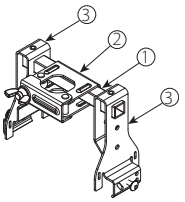
Style AB10

- Suspended ceilings
- Armstrong® TechZone™

Item	Description
1	6"/152 mm Square Bar*
2	Patented 1-Bee2® Center Bracket
3	End Bracket

NOTE

- FM/VdS/LPCB approved, cULus listed.



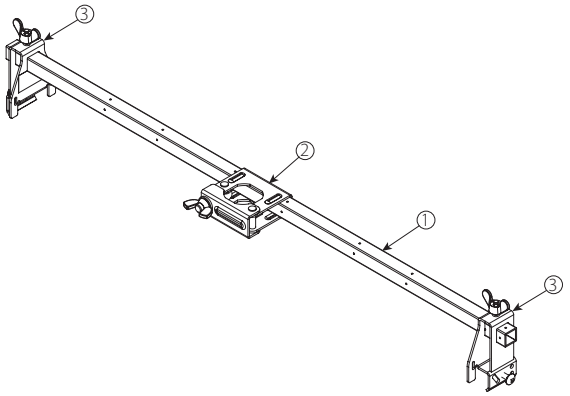
Style AB11

- Suspended ceilings
- Hard-Lid ceilings

Item	Description
1	24"/610 mm or 48"/1219 mm Square Bar
2	Patented 1-Bee2® Center Bracket
3	End Bracket

NOTE

- FM/VdS Approved, cULus listed.



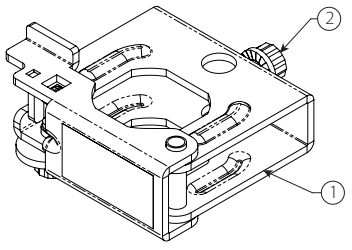
Style AB12

- Suspended ceilings
- Hard-Lid ceilings

Item	Description
1	Style AB12 Bracket Body
2	#2 Square Drive Set Screw

NOTE

- FM/VdS Approved.

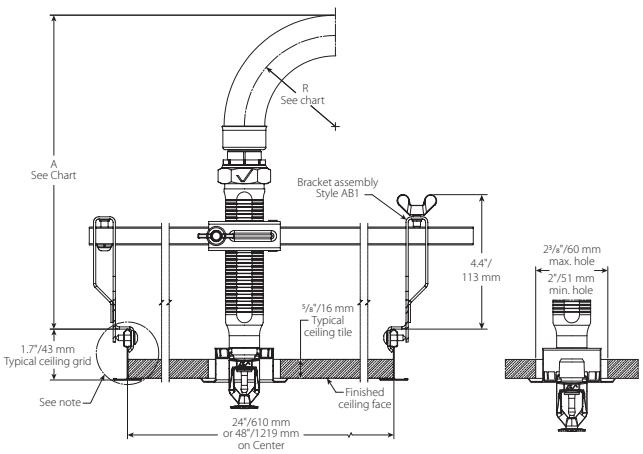


4.4 DIMENSIONS

CLEARANCES ABOVE CEILING

Series AH1 Braided Hose and Style AB1 Bracket

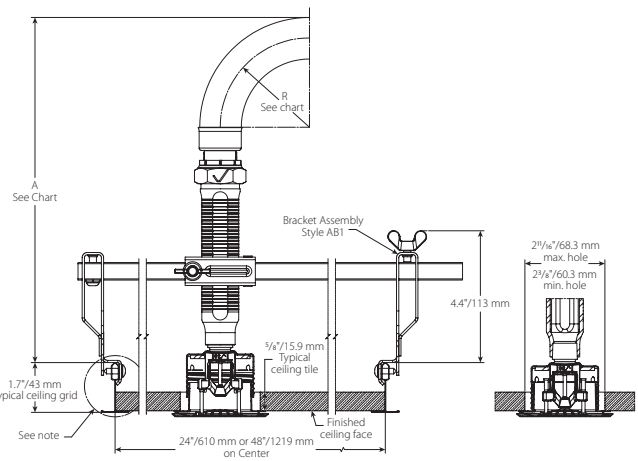
Suspended Ceiling Grid with Recessed Sprinkler



V2707 ¾"/19mm Max. Recess

Hose Clearance Chart							
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	2 50	3 80	4 100	5 125	6 150	7 175
A	Min.	8.6 218	9.6 244	10.6 269	11.6 295	12.6 320	13.6 345

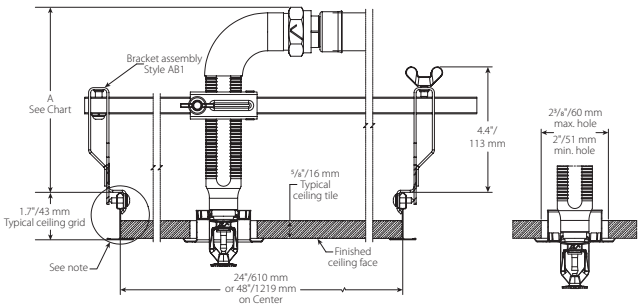
Suspended Ceiling Grid with Concealed Sprinkler



V3802 ½"/12.7mm Max. Recess

Hose Clearance Chart							
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	2 50	3 80	4 100	5 125	6 150	7 175
A	Min.	10.1 269	11.1 281	12.1 307	13.1 333	14.1 358	15.1 383

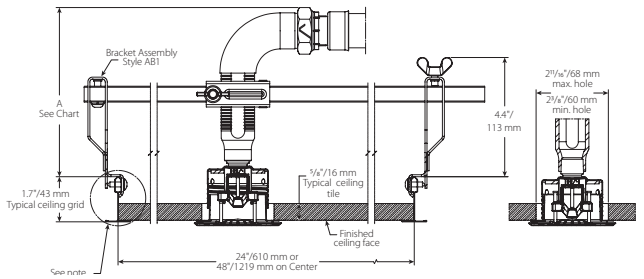
Suspended Ceiling Grid with Recessed Sprinkler with 90° Elbow (Long)



V2707 ¾"/19mm Max. Recess

Hose Clearance Chart		
Dimension		inches mm
A	Min.	8.0 200

Suspended Ceiling Grid with Concealed Sprinkler with 90° Elbow (Short)



V3802 ½"/12.7mm Max. Recess

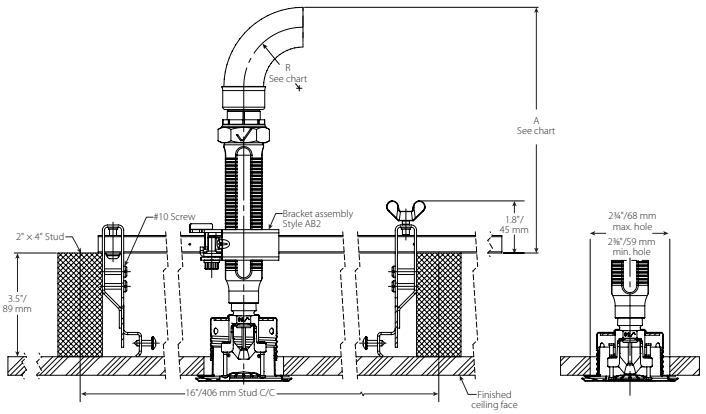
Hose Clearance Chart		
Dimension		inches mm
A	Min.	5.8 147

4.5 DIMENSIONS

CLEARANCES ABOVE CEILING

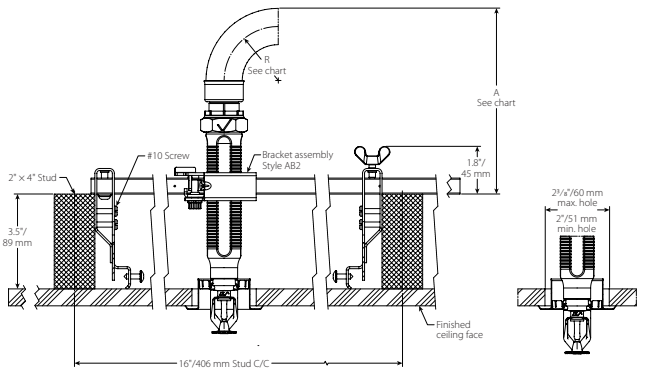
Series AH1 Braided Hose and Style AB2 Bracket

Hard-lid Ceiling with Concealed Sprinkler



V3802 ½"/12.7mm Max. Recess

Hard-lid Ceiling with Recessed Sprinkler



V2707 ¾"/19mm Max. Recess

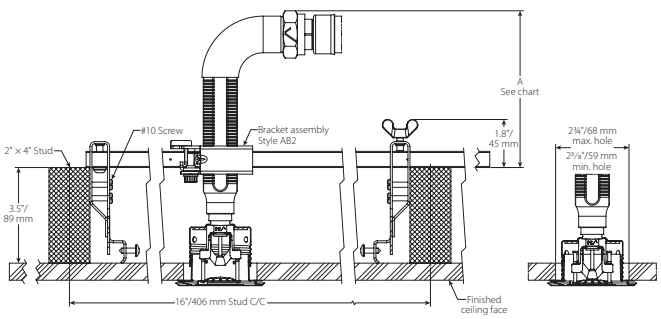
Hose Clearance Chart							
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	2 50	3 80	4 100	5 125	6 150	7 175
A	Min.	7.6 193	8.6 218	9.6 244	10.6 269	11.6 295	12.6 320

Hose Clearance Chart							
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	2 50	3 80	4 100	5 125	6 150	7 175
A	Min.	6.1 155	7.1 180	8.1 206	9.1 231	10.1 256	11.1 282

NOTE

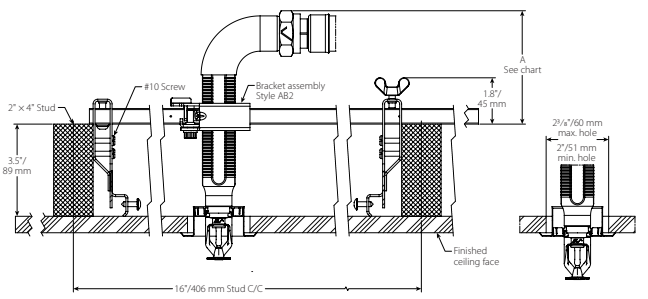
- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.

Hard-lid Ceiling Grid with Concealed Sprinkler with 90° Elbow (Short)



V3802 ½"/12.7mm Max. Recess

Hard-lid Ceiling with Recessed Sprinkler with 90° Elbow (Long)



V2707 ¾"/19mm Max. Recess

Hose Clearance Chart		
Dimension		inches mm
A	Min.	5.0 127

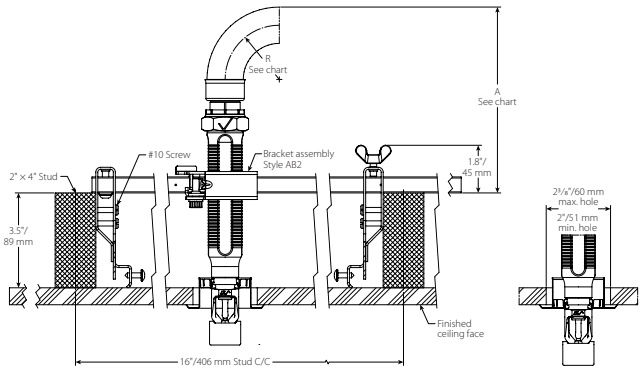
Hose Clearance Chart		
Dimension		inches mm
A	Min.	3.6 91

4.6 DIMENSIONS

CLEARANCES WITHIN SIDEWALL

Series AH1 Braided Hose and Style AB2 Bracket

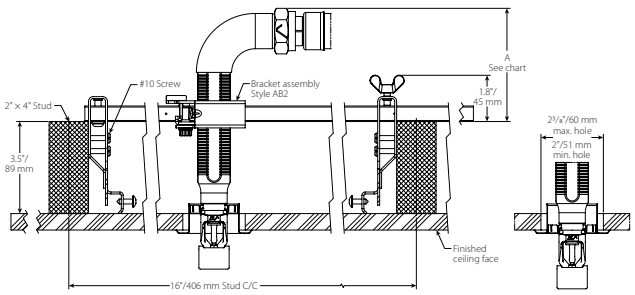
Horizontal Sidewall Sprinkler



V2707 ¾"/19mm Max. Recess

Hose Clearance Chart							
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	2 50	3 80	4 100	5 125	6 150	7 175
A	Min.	6.1 155	7.1 180	8.1 206	9.1 231	10.1 256	11.1 282

Horizontal Sidewall Sprinkler with 90° Elbow (Long)



V2707 ¾"/19mm Max. Recess

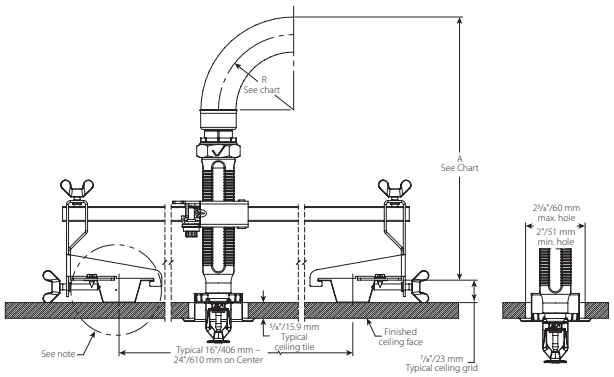
Hose Clearance Chart		
Dimension		inches mm
A	Min.	3.6 91

4.7 DIMENSIONS

CLEARANCES ABOVE CEILING

Series AH1 Braided Hose and Style AB4 Bracket

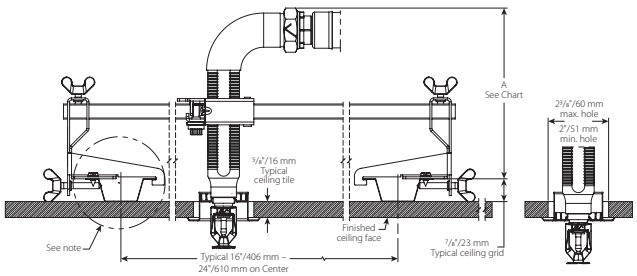
Hat Furring Channel Grid with Recessed Sprinkler



V2707 ¾"/19mm Max. Recess

Hose Clearance Chart							
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	2 50	3 80	4 100	5 125	6 150	7 175
A	Min.	8.8 224	9.8 249	10.8 274	11.8 300	12.8 325	13.8 351

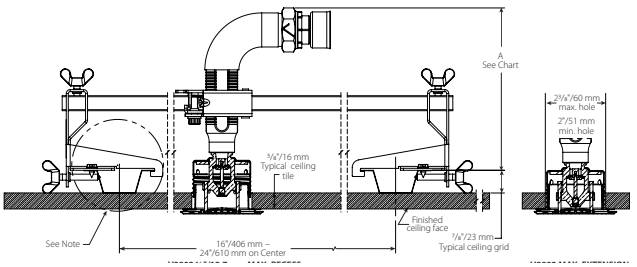
Hat Furring Channel Grid with Recessed Sprinkler with 90° Elbow (Long)



V2707 ¾"/19mm Max. Recess

Hose Clearance Chart		
Dimension		inches mm
A	Min.	8.0 200

Hat Furring Channel Grid with Concealed Sprinkler with 90° Elbow (Short)



V2707 ¾"/19mm Max. Recess

Hose Clearance Chart		
Dimension		inches mm
A	Min.	5.9 149

NOTE

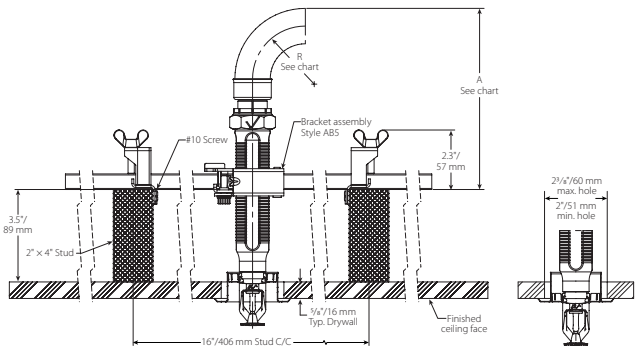
- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.

4.8 DIMENSIONS

CLEARANCES ABOVE CEILING

Series AH1 Braided Hose and Style AB5 Bracket

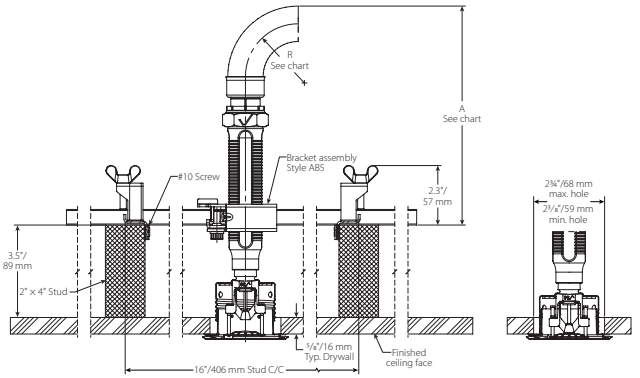
Hard-lid Ceiling with Recessed Sprinkler



V2707 ¾"/19mm Max. Recess

Hose Clearance Chart							
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	2 50	3 80	4 100	5 125	6 150	7 175
A	Min.	6.1 155	7.1 180	8.1 206	9.1 231	10.1 256	11.1 282

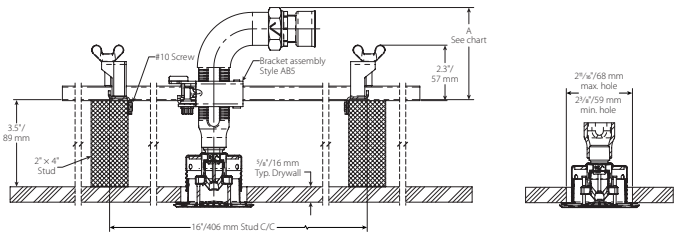
Hard-lid Ceiling with Concealed Sprinkler



V3802 ½"/13mm Max. Recess

Hose Clearance Chart							
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	2 50	3 80	4 100	5 125	6 150	7 175
A	Min.	7.6 193	8.6 218	9.6 244	10.6 269	11.6 295	12.6 320

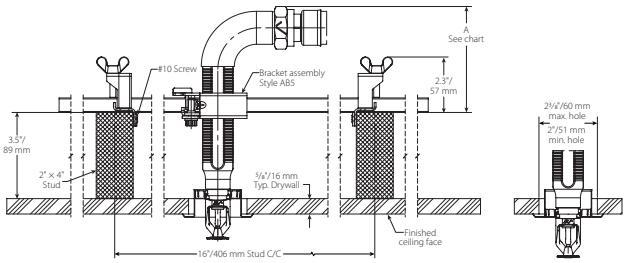
Hard-lid Ceiling with Concealed Pendent with 90° Elbow (Long)



V3802 ½"/13mm Max. Recess

Hose Clearance Chart		
Dimension		inches mm
A	Min.	3.6 91

Hard-lid Ceiling with Recessed Pendent with 90° Elbow (Short)



V2707 ¾"/19mm Max. Recess

Hose Clearance Chart		
Dimension		inches mm
A	Min.	3.3 84

NOTE

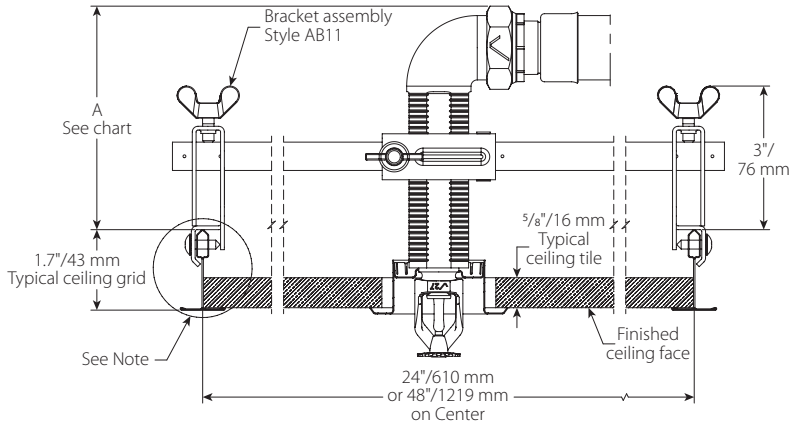
- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.

4.8 DIMENSIONS (Continued)

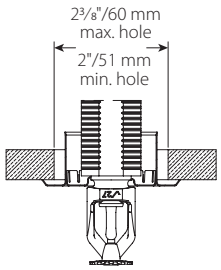
CLEARANCES ABOVE CEILING

Series AH1 Braided Hose and Style AB11 Bracket (LOW PROFILE SOLUTION)

Suspended Ceiling Grid with Recessed Sprinkler with LP 90° Elbow (Long)



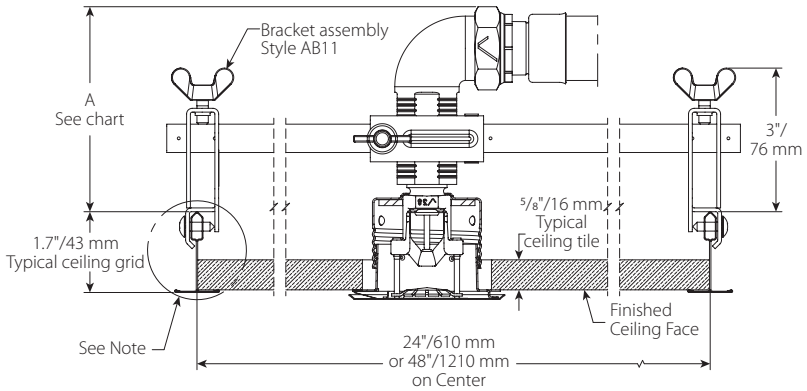
V2707 ¾"/19 mm MAX. RECESS



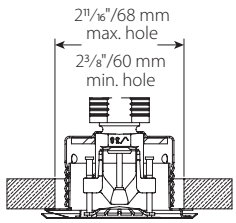
V2707 MAX. EXTENSION

Hose Clearance Chart		
Dimension		inches mm
A	Min.	4.0 100

Suspended Ceiling Grid with Concealed Pendent with LP 90° Elbow (Short)



V3802 ½"/13 mm MAX. RECESS



V3802 MAX. EXTENSION

Hose Clearance Chart		
Dimension		inches mm
A	Min.	3.9 99

NOTE

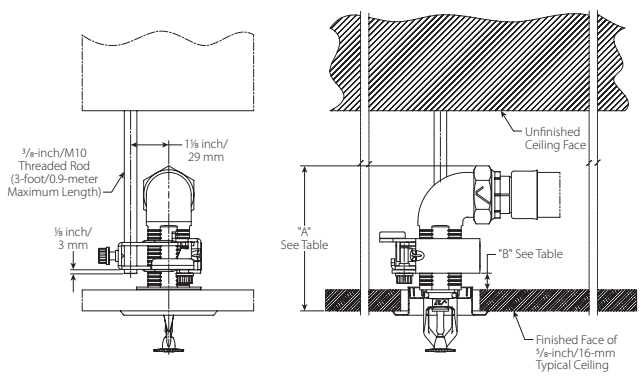
- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.

4.8 DIMENSIONS (Continued)

CLEARANCES ABOVE CEILING

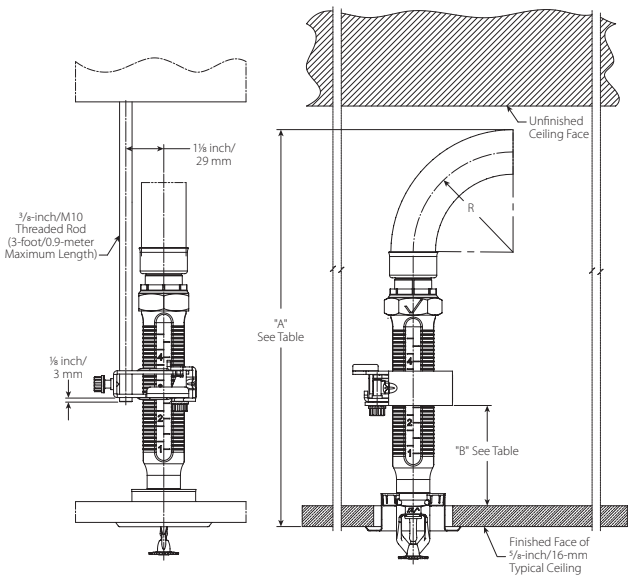
Series AH1 Braided Hose and Style AB12 Bracket

Suspended Ceiling Grid with Recessed Sprinkler with Low Profile Short Elbow



V2707 ½"/12.7 mm MAX. RECESS

Suspended Ceiling Grid with Recessed Sprinkler and Straight 5.75"/140mm Reducer



V2707 ¾"/19 mm MAX. RECESS

Dimension		Low Profile Short Elbow		Low Profile Long Elbow		Standard Short Elbow		Standard Long Elbow		Standard Straight Reducer	
		¾"/19mm Recessed* inches mm	Concealed inches mm	¾"/19mm Recessed inches mm	Concealed inches mm	¾"/19mm Recessed inches mm	Concealed inches mm	¾"/19mm Recessed inches mm	Concealed inches mm	¾"/ 19mm Recessed inches mm	Concealed inches mm
A	Minimum Required Installation Space	4.0 101.6	5.5 139.7	5.6 142.2	7.2 182.9	5.9 149.9	7.5 190.5	7.7 195.6	9.3 236.2	15.0 381.0	16.6 421.6
B	Distance from Top of Typical Ceiling Tile to Bottom of Gate	0.5 12.7	2.0 50.8	1.5 38.1	1.5 38.1	1.5 38.1	1.5 38.1	3.0 76.2	3.0 76.2	3.0 76.2	3.0 76.2

* Adjustability will be limited

NOTE

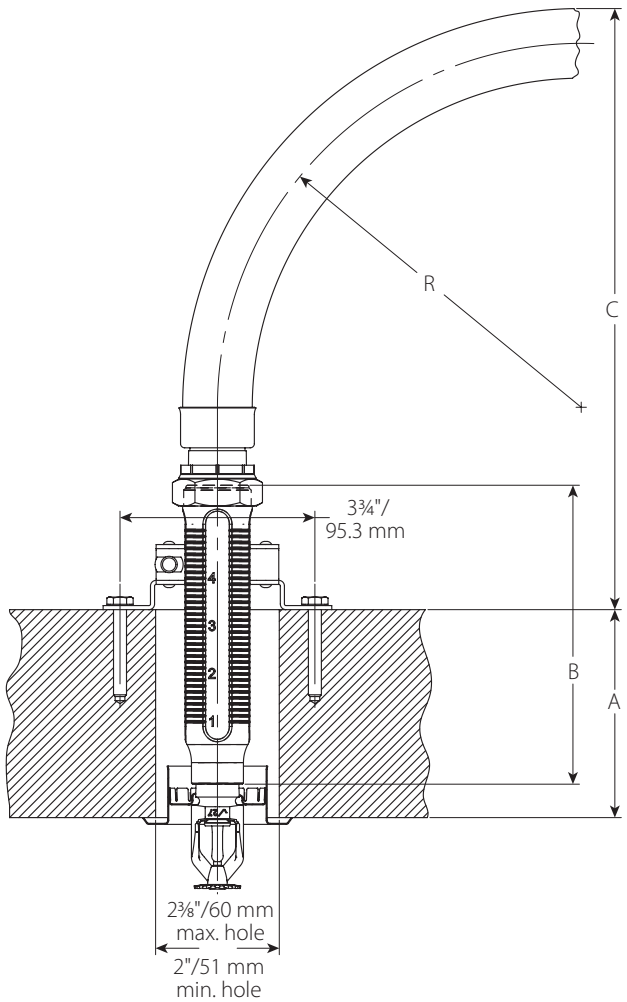
- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.

4.8 DIMENSIONS (Continued)

CLEARANCES ABOVE CEILING

Series AH1 Braided Hose and Style AB3 Bracket

Surface Mount Application with Recessed Sprinkler



Hose Clearances																				
Wall Thickness "A"	2 50			4 100			6 150		8 200	10 250	2 50			4 100			6 150		8 200	10 250
Outlet Length "B"	5.75 146.1	9 228.6	13 330.2	5.75 146.1	9 228.6	13 330.2	9 228.6	13 330.2	13 330.2	13 330.2	5.75 146.1	9 228.6	13 330.2	5.75 146.1	9 228.6	13 330.2	9 228.6	13 330.2	13 330.2	13 330.2
Hose Clearance "C"	11.6 294	14.8 376	18.8 478	9.6 243	12.8 325	16.8 427	10.8 275	14.8 376	12.8 325	10.8 275	12.6 319	15.8 402	19.8 503	10.6 268	13.8 351	17.8 452	11.8 300	15.8 402	13.8 351	11.8 300
Bend Radius "R"	7 175										8 200									

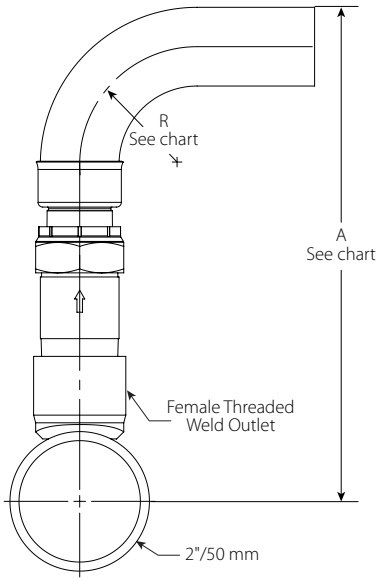
NOTE

- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.
- See installation instructions for mounting screw type and size.

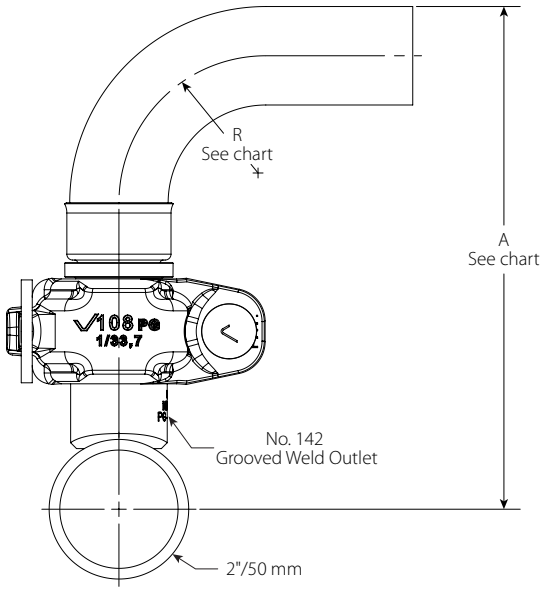
4.9 DIMENSIONS

BRANCHLINE CLEARANCES

Series AH1 Braided Hose with female threaded outlet



Series AH1-CC Braided Hose with grooved outlet



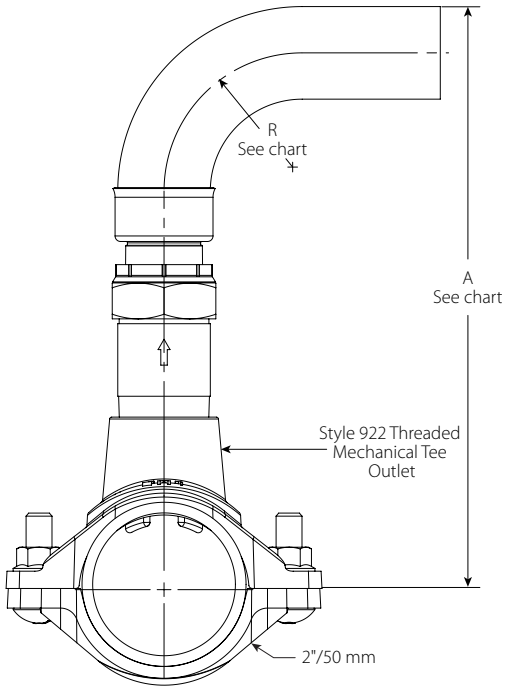
Hose Clearance Chart						
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	3 80	4 100	5 125	6 150	7 175
A	Min.	9.4 239	10.4 264	11.4 290	12.4 315	13.41 341

Hose Clearance Chart						
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	3 80	4 100	5 125	6 150	7 175
A	Min.	8.1 205	9.1 231	10.1 256	11.1 281	12.1 307

4.9 DIMENSIONS (Continued)

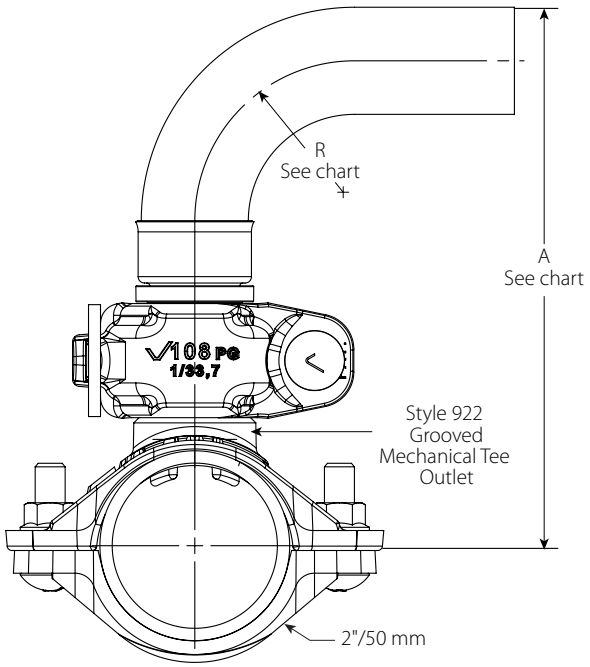
BRANCHLINE CLEARANCES

Series AH1 Braided Hose with Style 922 threaded outlet



Hose Clearance Chart						
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	3 80	4 100	5 125	6 150	7 175
A	Min.	9.4 238	10.4 263	11.4 289	12.4 314	13.4 339

Series AH1-CC Braided Hose with Style 922 grooved outlet



Hose Clearance Chart						
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	3 80	4 100	5 125	6 150	7 175
A	Min.	7.7 197	8.7 222	9.7 247	10.7 273	11.7 298

CALCULATIONS BASED ON UL LISTED FRICTION LOSS TABLE

5.0 PERFORMANCE – FRICTION LOSS DATA

Series AH1 and AH1-CC Braided Hose with Straight 5.75" Reducers Style AB1, AB2, AB4, AB5 and AB10 Brackets

Length of Stainless Steel Flexible Hose inches/mm	Outlet Size inches/mm/type	Equivalent Length of 1"/33.7 mm Sch. 40 Pipe (C=120) feet/meters	Maximum Number of 90° Bends at 3"/76.2 mm Bend Radius
31/775	½"/15/Straight	52/15.8	3
	¾"/20/Straight	55/16.8	3
36/900	½"/15/Straight	63/19.2	4
	¾"/20/Straight	66/20.1	4
48/1200	½"/15/Straight	78/23.8	4
	¾"/20/Straight	80/24.4	4
60/1500	½"/15/Straight	88/26.8	4
	¾"/20/Straight	90/27.4	4
72/1800	½"/15/Straight	112/34.1	5
	¾"/20/Straight	118/36.0	5

Series AH1 Braided Hose with 90° Low Profile Elbows Style AB11 VicFlex Bracket

inches/mm	inches/mm/type	Equivalent Length of 1"/33.7 mm Sch. 40 Pipe feet/meters	Maximum Number of 90° Bends at 3"/76.2 mm Bend Radius
31/775	½"/15	63/19.2	3
	¾"/20	65/19.8	3
36/900	½"/15	76/23.2	4
	¾"/20	76/23.2	4
48/1200	½"/15	99/30.2	4
	¾"/20	98/29.9	4
60/1500	½"/15	108/32.9	4
	¾"/20	102/31.1	4
72/1800	½"/15	124/37.8	5
	¾"/20	132/40.2	5

5.0 PERFORMANCE – FRICTION LOSS DATA

Series AH1 Braided Hose Equivalent Length Design Guide

Equivalent length values at various numbers of 90 degree bends at 3"/76.2 mm center line bend radius

Length of Stainless Steel Flexible Hose inches/mm	Outlet Size inches/mm	1 Bend feet/meters	2 Bends feet/meters	3 Bends feet/meters	4 Bends feet/meters	5 Bends feet/meters
31/775	½"/15	32/9.8	42/12.8	52/15.9	N.A	N.A
	¾"/20	33/10.1	44/13.4	55/16.8	N.A	N.A
36/900	½"/15	33/10.1	43/13.1	53/16.2	63/19.2	N.A
	¾"/20	36/11.0	46/14.0	56/17.1	66/20.1	N.A
48/1200	½"/15	46/14.0	57/17.4	68/20.7	78/23.8	N.A
	¾"/20	51/15.5	60/18.3	71/21.6	88/26.8	N.A
60/1500	½"/15	56/17.1	67/20.4	77/23.5	88/26.8	N.A
	¾"/20	58/17.7	69/21.0	80/24.4	90/27.4	N.A
72/1800	½"/15	69/21.0	79/24.1	91/27.7	102/31.1	112/34.1
	¾"/20	73/22.6	84/25.6	95/29.0	106/32.3	118/36.0

NOTES:

- Values for use with 5.75" straight reducers.

How to use this Design Guide:

- For some systems, it may be advantageous for the designer to calculate the system hydraulics using shorter equivalent lengths associated with fewer than the maximum allowable number of bends. In this case, the designer may select a design number of bends for the job and use the associated equivalent length from the design guide to determine the system hydraulics.
- It is possible that the actual installed condition of some of the flexible drops may have more bends than the designer selected. When this happens, the design guide may be used to find equivalent lengths based on the actual installed number of bends for particular sprinkler installations. The system hydraulics can be recalculated using actual equivalent lengths to verify the performance of the system.

5.0 PERFORMANCE – FRICTION LOSS DATA

Series AH1 and AH1-CC Braided Hose
Style AB1, AB2, AB3, AB4, AB5, AB7, AB7 Adj., AB8, AB10 and AB12 VicFlex Brackets

inches/mm	Imperial/S.I.	inches/mm/type	Equivalent Length of 1"/33.7mm Sch. 40 Pipe feet/meters	Maximum Number of 90° Bends at 7"/178mm Bend Radius
31/775	5.6/8.1	½"/15/Straight	53.8/16.4	2
		½"/15/90° Elbow	53.8/16.4	
36/900	5.6/8.1	½"/15/Straight	63.7/19.4	2
		½"/15/90° Elbow	63.1/19.2	
48/1200	5.6/8.1	½"/15/Straight	87.9/26.8	3
		½"/15/90° Elbow	85.8/26.1	
60/1500	5.6/8.1	½"/15/Straight	112.2/34.1	4
		½"/15/90° Elbow	108.4/33.0	
72/1800	5.6/8.1	½"/15/Straight	136.5/41.6	4
		½"/15/90° Elbow	131.1/39.9	
31/775	8.0/11.5	¾"/20/Straight	44.4/13.5	2
		¾"/20/90° Elbow	47.6/14.5	
36/900	8.0/11.5	¾"/20/Straight	55.6/16.9	2
		¾"/20/90° Elbow	57.5/17.5	
48/1200	8.0/11.5	¾"/20/Straight	82.8/25.2	3
		¾"/20/90° Elbow	81.7/24.9	
60/1500	8.0/11.5	¾"/20/Straight	110.1/24.9	4
		¾"/20/90° Elbow	105.9/32.2	
72/1800	8.0/11.5	¾"/20/Straight	137.3/41.8	4
		¾"/20/90° Elbow	130.2/39.7	
31/775	11.2/16.1	¾"/20/Straight	45.5/13.8	2
		¾"/20/90° Elbow	47.1/14.3	
36/900	11.2/16.1	¾"/20/Straight	66.3/20.2	2
		¾"/20/90° Elbow	57.5/17.5	
48/1200	11.2/16.1	¾"/20/Straight	82.7/25.2	3
		¾"/20/90° Elbow	82.8/25.2	
60/1500	11.2/16.1	¾"/20/Straight	109.1/33.2	4
		¾"/20/90° Elbow	108.1/32.9	
72/1800	11.2/16.1	¾"/20/Straight	135.5/41.3	4
		¾"/20/90° Elbow	133.4/40.6	
31/775	14.0/20.2	¾"/20/Straight	44.3/13.5	2
		¾"/20/90° Elbow	46.4/14.1	
36/900	14.0/20.2	¾"/20/Straight	55.5/16.9	2
		¾"/20/90° Elbow	56.7/17.3	
48/1200	14.0/20.2	¾"/20/Straight	83.0/25.3	3
		¾"/20/90° Elbow	82.1/25.0	
60/1500	14.0/20.2	¾"/20/Straight	110.4/33.6	4
		¾"/20/90° Elbow	107.5/32.7	
72/1800	14.0/20.2	¾"/20/Straight	137.9/42.0	4
		¾"/20/90° Elbow	132.8/40.4	

FM NOTES:

- Series AH1 has been tested and Approved by FM Global for use in wet, dry and preaction systems per NFPA 13, 13R, and 13D and FM data sheets 2-0, 2-5, and 2-8. FM 1637 and Vds standards for safety include, but are not limited to, pressure cycling, corrosion resistance, flow characterisitics, vibration resistance, leakage, mechanical and hydrostatic strength.
- EXAMPLE: A 48-inch hose installed with two 30° bends and two 90° bends is permitted and considered equivalent to the data in the table shown above. In this example, the total number of degrees is 240°, which is less than the allowable 270°.

5.0 PERFORMANCE – FRICTION LOSS DATA

Series AH1 Braided Hose with 90° Low Profile Elbows Style AB5, AB11 and AB12 VicFlex Bracket

Length of Stainless Steel Flexible Hose inches/mm	K-Factor Imperial/S.I.	Outlet Size inches/mm	Equivalent Length of 1"/33.7mm Sch. 40 Pipe feet/meters	Maximum Number of 90° Bends at 7"/178mm Bend Radius
31/775	5.6/8.1	½"/15	49.0/14.9	2
36/900	5.6/8.1	½"/15	58.5/17.8	2
48/1200	5.6/8.1	½"/15	81.5/24.8	3
60/1500	5.6/8.1	½"/15	104.4/31.8	4
72/1800	5.6/8.1	½"/15	127.4/38.8	4
31/775	8.0/11.5	¾"/20	47.6/14.5	2
36/900	8.0/11.5	¾"/20	57.7/17.6	2
48/1200	8.0/11.5	¾"/20	81.9/25.0	3
60/1500	8.0/11.5	¾"/20	106.1/32.3	4
72/1800	8.0/11.5	¾"/20	130.5/39.8	4
31/775	11.2/16.1	¾"/20	48.6/14.8	2
36/900	11.2/16.1	¾"/20	58.2/17.7	2
48/1200	11.2/16.1	¾"/20	82.2/25.1	3
60/1500	11.2/16.1	¾"/20	104.2/31.8	4
72/1800	11.2/16.1	¾"/20	127.5/38.8	4
31/775	14.0/20.2	¾"/20	47.9/14.6	2
36/900	14.0/20.2	¾"/20	58.0/17.7	2
48/1200	14.0/20.2	¾"/20	82.2/25.1	3
60/1500	14.0/20.2	¾"/20	106.4/32.4	4
72/1800	14.0/20.2	¾"/20	130.8/39.9	4

FM NOTES:

- Series AH1 has been tested and Approved by FM Global for use in wet, dry and preaction systems per NFPA 13, 13R, and 13D and FM data sheets 2-0, 2-5, and 2-8. FM 1637 and Vds standards for safety include, but are not limited to, pressure cycling, corrosion resistance, flow characterisitics, vibration resistance, leakage, mechanical and hydrostatic strength.
- Differences in equivalent lengths are due to varying test methods, per FM 1637 and VdS standards. Refer to these standards for additional information regarding friction loss test methods.
- EXAMPLE: A 48-inch hose installed with two 30° bends and two 90° bends at a 7-inch bend radius is permitted and considered equivalent to the data in the table shown above. In this example, the total number of degrees is 240°, which is less than the allowable 270°.

5.0 PERFORMANCE – FRICTION LOSS DATA

Series AH1 and AH1-CC Braided Hose
Style AB1, AB2, AB4, AB5, AB7, AB7 Adj., AB8, AB10, AB11 and AB12 Brackets

Length of Stainless Steel Flexible Hose mm/inches	Outlet Size mm/inches/type	Equivalent Length of steel pipe according to EN 10255 DN 20 (26,9 x 2,65) meters/feet	Maximum Number of 90° Bends at 3"/76.2mm Bend Radius meters/feet
790/31	15mm/½"/Straight	4.0/12.9	3
	20 mm/¾"/Straight		
915/36	15mm/½"/Straight	4.6/15.0	3
	20 mm/¾"/Straight		
1220/48	15mm/½"/Straight	6.1/20.0	3
	20 mm/¾"/Straight		
1525/60	15mm/½"/Straight	7.6/25.0	4
	20 mm/¾"/Straight		
1830/72	15mm/½"/Straight	9.2/30.0	4
	20 mm/¾"/Straight		

VDS CEILING MANUFACTURERS LIST

AB1, AB2, AB7, AB10, AB11, AB12

1. AMF
2. Armstrong
3. Chicago Metallic
4. Dipling
5. Durlum
6. Geipel
7. Gema-Armstrong
8. Hilti
9. Knauf
10. Lafarge
11. Linder
12. Odenwald
13. Richter
14. Rigips
15. Rockfon Pagos
16. Suckow & Fischer
17. USG Donn

AB4

No specific approval

AB8

1. Hilti
2. Knauf
3. Lafarge
4. Lindner
5. Rigips

5.0 PERFORMANCE – FRICTION LOSS DATA (continued)

Series AH1 and AH1-CC Braided Hose
Style AB1, AB2, AB3, AB4, AB5, AB7, AB8 and AB10 Brackets

Length of Stainless Steel Flexible Hose mm/inches	Outlet Size mm/inches/type	Equivalent Length of steel pipe according to EN 10255 DN 25 (33,7 x 3,25) meters/feet	Maximum Number of 90° Bends at 3"/76.2mm Bend Radius
790/31	15mm/½"/Straight	12.7/41.8	2
	20 mm/¾"/Straight		
	15mm/½"/90° Elbow	13.6/44.6	2
	20 mm/¾"/90° Elbow		
915/36	15mm/½"/Straight	16.4/53.8	3
	20 mm/¾"/Straight		
	15mm/½"/90° Elbow	16.9/55.4	3
	20 mm/¾"/90° Elbow		
1220/48	15mm/½"/Straight	19.6/64.3	3
	20 mm/¾"/Straight		
	15mm/½"/90° Elbow	19.9/65.1	3
	20 mm/¾"/90° Elbow		
1525/60	15mm/½"/Straight	24.0/78.8	3
	20 mm/¾"/Straight		
	15mm/½"/90° Elbow	24.5/80.2	3
	20 mm/¾"/90° Elbow		
1830/72	15mm/½"/Straight	27.8/91.1	3
	20 mm/¾"/Straight		
	15mm/½"/90° Elbow	28.5/93.4	3
	20 mm/¾"/90° Elbow		

Series AH1 Flexible Hose Friction Loss Data

Model	Length of Flexible Hose mm inches	Equivalent Length Straight Configuration meters feet	Equivalent Length Bend Configuration meters feet
AH1-31	790 31	4.78 15.7	5.80 19.0
AH1-36	915 36	5.59 18.3	10.15 33.3
AH1-48	1120 48	9.75 32.0	16.25 53.3
AH1-60	1525 60	12.15 39.9	22.94 75.3
AH1-72	1830 72	14.26 46.8	25.98 85.2

NOTE

- Friction loss data is in accordance with GB5135.16 tested at a flow rate of 114 liters per minute (30 gallons per minute).

6.0 NOTIFICATIONS

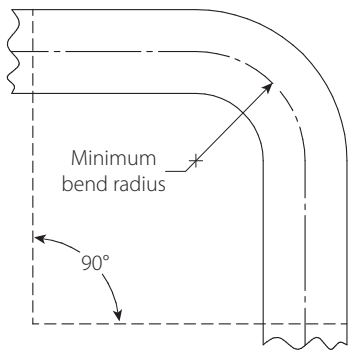
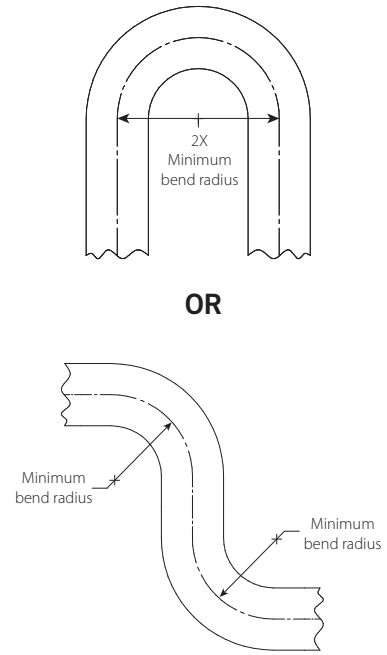
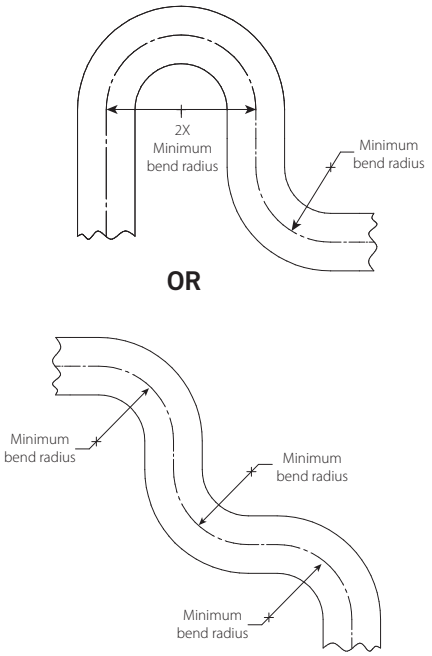
⚠ WARNING

- **It is the responsibility of the system designer to verify suitability of 300-series stainless steel flexible hose for use with the intended fluid media within the piping system and external environments.**
- **The effect of chemical composition, pH level, operating temperature, chloride level, oxygen level, and flow rate on 300-series stainless steel flexible hose must be evaluated by the material specifier to confirm system life will be acceptable for the intended service.**

Failure to follow these instructions could cause product failure, resulting in serious personal injury and/or property damage.

7.0 REFERENCE MATERIALS – CHARACTERISTICS

Flexible Hose In-Plane Bend Characteristics

One Bend	Two Bends	Three Bends
		

NOTE

- For out-of-plane (three-dimensional) bends, care must be taken to avoid imparting torque on the hose.

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.

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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 I-VICFLEX-AB1-AB2-AB10, I-VICFLEX-AB4-AB9, I-VICFLEX-AB7, or I-VICFLEX-AB8 for the product you are installing. Handbooks are included with each shipment of Victaulic products for 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.

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Section 2 – Pipe and Fittings

Schedule 10 and Schedule 40

FM Approved and UL Listed Sprinkler Pipe

Bull Moose Tube Company is a recognized producer of quality pipe products. Our Schedule 10 and Schedule 40 are FM Approved and UL Listed (for U.S. and Canada), even though these products do not require separate approvals and listings. Bull Moose Tube made the decision to have them approved and listed for your peace of mind. Our Sch. 10 and Sch. 40 have been through the same rigorous testing as our other fine pipe products.

Bull Moose Tube's Sch. 10 and Sch. 40 pipes are made to ASTM A135 and ASTM A795. These products are typically supplied with our protective coating but can be supplied without the coating so they can be hot-dip galvanized to meet FM requirements for use in dry systems in accordance with the zinc coating specifications of ASTM A795 or ASTM A53.

Schedule 10 Pipe

Nominal Pipe Size (in)	O.D. (in)	I.D. (in)	Nom. Wall (in)	Weight/Ft	Bundle Size
1	1.315	1.097	0.109	1.40 lbs/ft	91
1-1/4	1.660	1.442	0.109	1.81 lbs/ft	61
1-1/2	1.900	1.682	0.109	2.08 lbs/ft	61
2	2.375	2.157	0.109	2.64 lbs/ft	37
2-1/2	2.875	2.635	0.120	3.53 lbs/ft	30
3	3.500	3.260	0.120	4.33 lbs/ft	19
4	4.500	4.260	0.120	5.62 lbs/ft	19

Schedule 40 Pipe

Nominal Pipe Size (in)	O.D. (in)	I.D. (in)	Nom. Wall (in)	Weight/Ft	Bundle Size
1	1.315	1.049	0.133	1.68 lbs/ft	70
1-1/4	1.660	1.380	0.140	2.27 lbs/ft	51
1-1/2	1.900	1.610	0.145	2.72 lbs/ft	44
2	2.375	2.067	0.154	3.65 lbs/ft	30

PIPE PREPARATION

For proper operation, all pipe surfaces should be cleaned prior to installation. In order to provide a leak-tight seat for the gasket, pipe surfaces should be free from indentations and projections from the end of the pipe to the groove. All loose paint, scale, dirt, chips, grease, and rust must be removed prior to installation. Failure to take these important steps may result in improper coupling assembly, causing leakage. Also, check the manufacturer's instructions for the specific fitting used.

BULL MOOSE TUBE COMPANY

A CAPARO company

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Cast Iron Threaded Fittings

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Cast Iron Threaded Fittings

Specifications

- The SCI branded Cast Iron threaded fittings are UL Listed and FM Approved at 300 psi
- Rated to 125# WSP
- Casting date on each fitting
- Grey iron castings conform to ASTM A126
- Cast iron fitting dimensions conform to ASME B16.4 Class 125
- NPT threads on fittings conform to ASME B1.20.1
- The SCI branded Cast Iron threaded fittings and are 100% Air Tested
- Manufacturing facility is ISO 9001:2000 and ISO 14001

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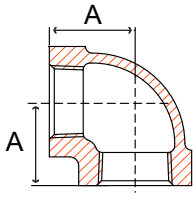
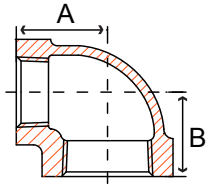
Fig. 37E 1 – 90° Elbow



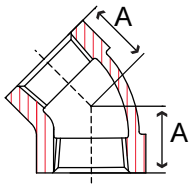
Size IN	Part Number	A IN	Packing Inner	Packing Master	Weight LB
1/2	37E 1004	1.13	90	180	0.3
3/4	37E 1006	1.31	50	100	0.5
1	37E 1010	1.50	35	70	0.8
1-1/4	37E 1012	1.75	20	40	1.3
1-1/2	37E 1014	1.94	15	30	1.7
2	37E 1020	2.25	7	14	2.7
2-1/2	37E 1024	2.70	4	8	4.3

Fig. 37RE1 – 90° Reducing Elbow



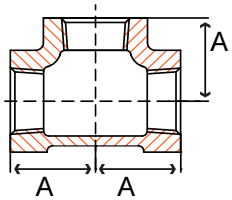
Size IN	Part Number	A IN	B IN	Packing Inner	Packing Master	Weight LB
1 x 1/2	37RE1010004	1.36	1.26	50	100	0.5
1 x 3/4	37RE1010006	1.45	1.38	40	80	0.7
1-1/4 x 1/2	37RE1012004	1.53	1.34	32	64	0.8
1-1/4 x 3/4	37RE1012006	1.63	1.45	28	56	0.9
1-1/4 x 1	37RE1012010	1.67	1.58	25	50	1.0
1-1/2 x 1/2	37RE1014004	1.75	1.52	25	50	1.0
1-1/2 x 3/4	37RE1014006	1.75	1.52	20	40	1.1
1-1/2 x 1	37RE1014010	1.80	1.65	18	36	1.3
1-1/2 x 1-1/4	37RE1014012	1.88	1.82	14	28	1.5
2 x 1/2	37RE1020004	1.97	1.60	15	30	1.4
2 x 3/4	37RE1020006	1.97	1.60	15	30	1.6
2 x 1	37RE1020010	2.02	1.73	12	24	1.8
2 x 1-1/2	37RE1020014	2.16	2.02	10	20	2.3

Fig. 37F 1 – 45° Elbow



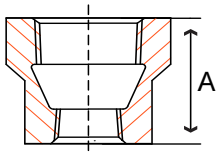
Size IN	Part Number	A IN	Packing Inner	Packing Master	Weight LB
1	37F 1010	1.26	40	80	0.7
1-1/4	37F 1012	1.29	22	44	1.2
1-1/2	37F 1014	1.44	16	32	1.5
2	37F 1020	1.69	8	16	2.6

Fig. 37T 1 – Tee



Size IN	Part Number	A IN	Packing Inner	Packing Master	Weight LB
1/2	37T 1004	1.13	60	120	0.4
3/4	37T 1006	1.31	30	60	0.7
1	37T 1010	1.50	20	40	1.1
1-1/4	37T 1012	1.75	12	24	1.8
1-1/2	37T 1014	1.94	8	16	2.4
2	37T 1020	2.25	5	10	3.8

Fig. 37RC1 – Hex Coupling



Size IN	Part Number	A IN	Packing Inner	Packing Master	Weight LB
1 x 1/2	37RC1010004	1.69	60	120	0.5
1 x 3/4	37RC1010006	1.69	50	100	0.6
2 x 1 (not hex)	37RC1020010	2.81	16	32	1.5

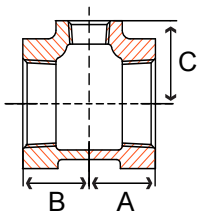


Fig. 37RT1 – Reducing Tee

Size IN	Part Number	A IN	B IN	C IN	Packing Inner	Packing Master	Weight LB
1 x 1/2	37RT1010004	1.26	1.26	1.36	25	50	0.9
1 x 1/2 x 1	37RT1010004010	1.50	1.36	1.50	24	48	0.9
1 x 3/4	37RT1010006	1.38	1.38	1.45	22	44	1.0
1 x 3/4 x 1	37RT1010006010	1.50	1.45	1.50	20	40	1.0
1 x 1-1/4	37RT1010012	1.67	1.67	1.58	15	30	1.4
1-1/4 x 1/2	37RT1012004	1.34	1.34	1.53	18	36	1.3
1-1/4 x 1/2 x 1-1/4	37RT1012004012	1.75	1.53	1.75	18	36	1.4
1-1/4 x 3/4	37RT1012006	1.45	1.45	1.62	15	30	1.4
1-1/4 x 3/4 x 1-1/4	37RT1012006012	1.75	1.62	1.75	15	30	1.5
1-1/4 x 1	37RT1012010	1.58	1.58	1.67	15	30	1.6
1-1/4 x 1 x 1/2	37RT1012010004	1.34	1.26	1.53	20	40	1.1
1-1/4 x 1 x 3/4	37RT1012010006	1.45	1.38	1.63	16	32	1.2
1-1/4 x 1 x 1	37RT1012010010	1.58	1.50	1.69	15	30	1.4
1-1/4 x 1 x 1-1/4	37RT1012010012	1.75	1.69	1.75	12	24	1.6
1-1/4 x 1 x 1-1/2	37RT1012010014	1.88	1.80	1.82	12	24	1.8
1-1/4 x 1-1/2	37RT1012014	1.88	1.88	1.82	10	20	2.0
1-1/2 x 1/2	37RT1014004	1.41	1.41	1.66	12	24	1.6
1-1/2 x 1/2 x 1-1/4	37RT1014004012	1.81	1.56	1.88	12	24	1.7
1-1/2 x 1/2 x 1-1/2	37RT1014004014	1.94	1.66	1.94	12	24	1.8
1-1/2 x 3/4	37RT1014006	1.52	1.52	1.75	12	24	1.8
1-1/2 x 3/4 x 1-1/4	37RT1014006012	1.94	1.66	1.88	12	24	1.7
1-1/2 x 3/4 x 1-1/2	37RT1014006014	1.94	1.75	1.94	12	24	1.9
1-1/2 x 1	37RT1014010	1.65	1.65	1.80	10	20	1.9
1-1/2 x 1 x 1/2	37RT1014010004	1.44	1.25	1.69	18	36	1.3
1-1/2 x 1 x 3/4	37RT1014010006	1.50	1.44	1.75	15	30	1.4
1-1/2 x 1 x 1	37RT1014010010	1.65	1.50	1.80	12	24	1.6
1-1/2 x 1 x 1-1/4	37RT1014010012	1.82	1.67	1.88	10	20	1.8
1-1/2 x 1 x 1-1/2	37RT1014010014	1.94	1.80	1.94	8	16	2.1
1-1/2 x 1-1/4	37RT1014012	1.82	1.82	1.88	8	16	2.2
1-1/2 x 1-1/4 x 1/2	37RT1014012004	1.41	1.34	1.66	15	30	1.5
1-1/2 x 1-1/4 x 3/4	37RT1014012006	1.52	1.45	1.75	12	24	1.6
1-1/2 x 1-1/4 x 1	37RT1014012010	1.65	1.58	1.80	12	24	1.8
1-1/2 x 1-1/4 x 1-1/4	37RT1014012012	1.82	1.75	1.88	10	20	2.1
1-1/2 x 1-1/4 x 1-1/2	37RT1014012014	1.94	1.88	1.94	8	16	2.3
1-1/2 x 1-1/4 x 2	37RT1014012020	2.16	2.10	2.02	6	12	2.7
1-1/2 x 2	37RT1014020	2.16	2.16	2.02	5	10	2.9
2 x 1/2	37RT1020004	1.49	1.49	1.88	8	16	2.6
2 x 3/4	37RT1020006	1.60	1.60	1.97	8	16	2.6
2 x 1	37RT1020010	1.73	1.73	2.02	6	12	2.9
2 x 1 x 2	37RT1020010020	2.25	2.02	2.25	5	10	3.1
2 x 1-1/4	37RT1020012	1.90	1.90	2.10	5	10	3.2
2 x 1-1/4 x 2	37RT1020012020	2.25	2.10	2.25	5	10	3.2
2 x 1-1/2	37RT1020014	2.02	2.02	2.16	5	10	3.3
2 x 1-1/2 x 1/2	37RT1020014004	1.49	1.41	1.88	8	16	2.1
2 x 1-1/2 x 3/4	37RT1020014006	1.60	1.52	1.97	8	16	2.2
2 x 1-1/2 x 1	37RT1020014010	1.73	1.65	2.02	8	16	2.4
2 x 1-1/2 x 1-1/4	37RT1020014012	1.90	1.82	2.10	7	14	2.7
2 x 1-1/2 x 1-1/2	37RT1020014014	2.02	1.94	2.16	7	14	2.9
2 x 1-1/2 x 2	37RT1020014020	2.25	2.16	2.25	5	10	3.4
2 x 2-1/2	37RT1020024	2.60	2.60	2.39	3	6	4.6

Warranty and Limitations of Liability

SMITH-COOPER INTERNATIONAL (SCI) warrants to its initial purchaser only, that its products which are delivered to this initial purchaser will be of the kind described in the order or price list and will be free of defects in workmanship or material for a period of five years from the date of delivery to our initial purchaser.

Should any failure to conform to this warranty appear within five years after the date of the initial delivery to our initial purchaser, SCI will, upon written notification thereof and substantiation that the goods have been stored, installed, maintained and operated in accordance with recognized engineering and piping practices and industry standards, correct such defects by suitable repair or replacement (which alternative shall be at the discretion of SCI) of product at SCI's own expense upon return of the defective part to SCI.

In the event that SCI elects to replace the defective product, SCI shall pay up to $50 per defective product for total cost of replacement. In the event of multiple claims, such payment shall be no greater than $1,000 for each installation project.

This warranty applies only during normal use that meets the above referenced conditions of installation and operation and is absolutely void if the product has been damaged after purchase or if it has been misused, repaired, altered or modified in any manner whatsoever. SCI shall not warranty any of its products if any portion of the product including without limitation, any component, gasket, housing or bolt has been modified, altered, remanufactured or replaced in any manner by any customer, user of the product or third party.

Correction of non-conformities, in the manner and for the period of time provided above, shall constitute fulfillment of all liabilities of SCI to our initial purchaser, with respect to the goods, whether based on contract, negligence, strict tort, or otherwise. It is the intention of SCI that no warranty of any kind, whether expressed or implied shall pass through our initial purchaser to any other person or corporation.

No returns will be allowed unless prior written permission of SCI is first obtained. Buyers shall be responsible for all costs of transportation as well as a restocking charge.

This warranty is exclusively for the benefit of the initial purchaser of this product from SCI and, except to the extent prohibited by applicable law, the foregoing warranty is in lieu of all other warranties, express or implied, including but not limited to warranties of fitness or merchantability.

LIMITATIONS OF LIABILITY: SCI shall not under any circumstances be liable for special or consequential damages such as, but not limited to damage to loss of other property or equipment, loss of profits or revenue, cost of capital, cost of purchased or replacement goods, claims of customers of our initial purchaser, any labor cost for repair or replacement of the product or damage caused by the product.

The remedies of our initial purchaser, and all others, set forth herein are exclusive, and the liability of SCI with respect to same shall not, except as expressly provided herein, exceed the price of the SCI products on which such liability is based.

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- Bronze Fittings
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- Forged Steel Fittings
- Merchant Steel
- COOPLETS®
- Nipples
- Lead Free

Valves

- Ball
- Gate
- Globe
- Check
- Butterfly
- Straight Stops
- Hose Bibbs / Sillcocks
- Boiler Drains
- Specialties

Stainless Steel

- 150# Fittings
- 3000# Forged Fittings
- Weld Fittings
- Sanitary Fittings
- Compression Fittings
- Flanges
- Nipples
- Pipe & Tubing
- Valves

Grooved

- Couplings
- Fittings
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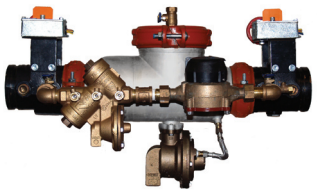
Section 3 – Valves

WILKINS
a ZURN company

Model 375ASTDA
Reduced Pressure Detector Assembly

SPECIFICATION SUBMITTAL SHEET



FEATURES

Sizes: ❑ 2 1/2" ❑ 3" ❑ 4" ❑ 6" ❑ 8" ❑ 10"

Maximum working water pressure	175 PSI
Maximum working water temperature	140°F
Hydrostatic test pressure	350 PSI
End connections (Grooved for steel pipe)	AWWA C606
(Flanged)	ANSI B16.1 Class 125

OPTIONS
(Suffixes can be combined)

- ❑ - with flanged end OS & Y gate valves (standard)
- ❑ LM - less water meter
- ❑ - with remote reading meter
- ❑ - with gpm meter (standard)
- ❑ - with cu ft/min meter
- ❑ G - with grooved end OS&Y gate valves
- ❑ FG - with flanged inlet gate connection and grooved outlet gate connection
- ❑ MS - with Integral Relief Valve Monitor Switch
- ❑BGVIC - with grooved end butterfly valves
- ❑ PI - with Post Indicator Gate Valves

ACCESSORIES

- ❑ Air gap (Model AG)
- ❑ Repair kit (rubber only)
- ❑ Thermal expansion tank (Model XT)
- ❑ OS & Y Gate valve tamper switch (OSY-40)
- ❑ QT-SET Quick Test Fitting Set
- ❑ Test Cock Lock (Model TCL24)

DIMENSIONS & WEIGHTS (do not include pkg.)

MODEL 375ASTDA SIZE		WEIGHT					
		WITH OS&Y GATES (GXF)		WITH OS&Y GATES (GXG)		WITH BUTTERFLY VALVES	
in.	mm	lbs.	kg	lbs.	kg	lbs.	kg
2 1/2	65	137	62	127	58	81	37
3	80	155	71	143	65	85	39
4	100	229	104	209	95	96	44
6	150	364	166	334	152	154	70
8	200	681	309	627	284	328	149
10	250	900	408	842	382	434	197

APPLICATION

Designed for installation on potable water lines in fire protection systems to protect against both backsiphonage and backpressure of contaminated water into the potable water supply. The Model 375ASTDA shall provide protection where a potential health hazard exists. Incorporates metered by-pass to detect leaks and unauthorized water use.

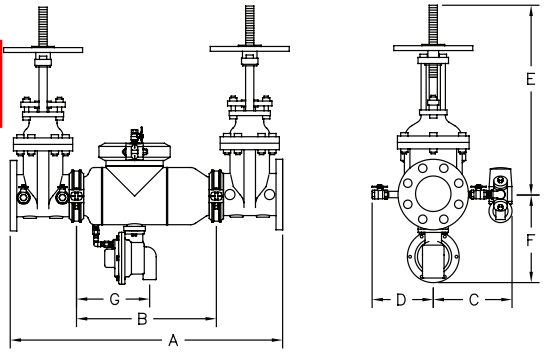
STANDARDS COMPLIANCE

- ASSE® Listed 1047
- UL® Classified
- C-UL® Classified
- FM® Approved
- CSA® Certified (2-1/2" TO 6")

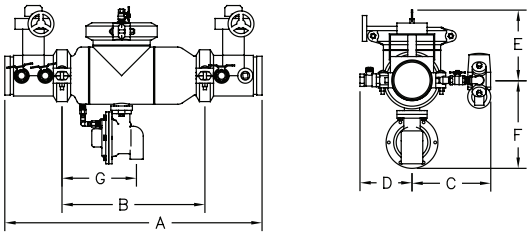
MATERIALS

Main valve body	304L Stainless steel
Access covers	304L Stainless steel
Internals	Stainless steel, 300 Series NORYL™, NSF Listed
Fasteners & Springs	Stainless Steel, 300 Series
Elastomers	EPDM (FDA approved) Buna Nitrile (FDA approved)
Polymers	NORYL™, NSF Listed
Sensing line	Stainless steel, braided hose

MODEL 375ASTDA with standard OS&Y



MODEL 375ASTDA with BGVIC option

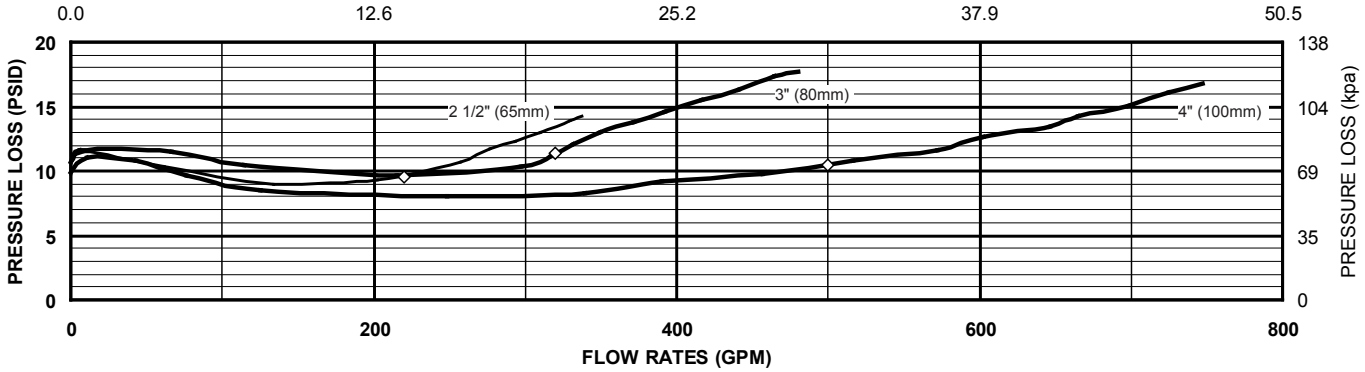


Relief Valve discharge port:
2 1/2"- 6" - 2.75 sq. in.
8" -10" - 3.69 sq. in.

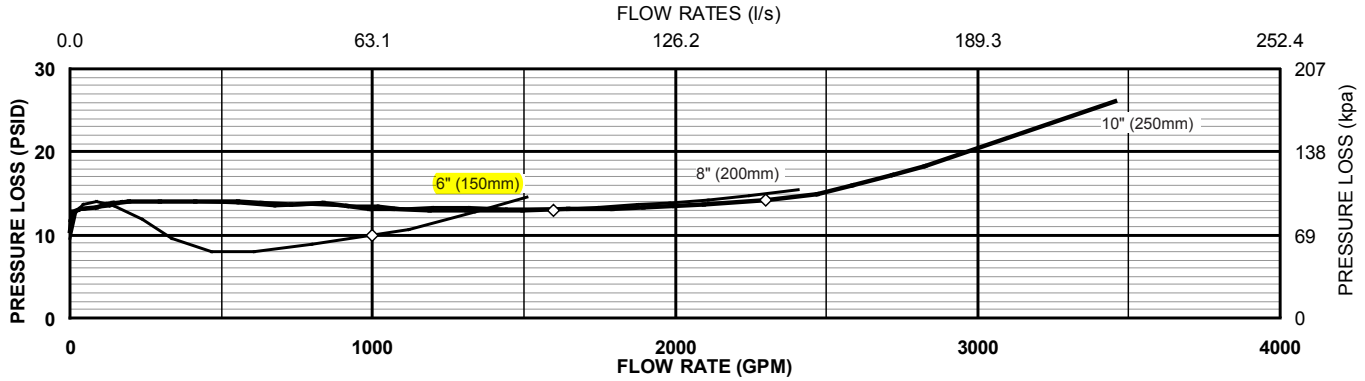
MODEL 375ASTDA SIZE		DIMENSION (approximate)																			
		A		A WITH BUTTERFLY VALVES		B LESS GATE VALVES		C		D		E OS&Y OPEN		E OS&Y CLOSED		E WITH BUTTERFLY VALVES		F		G	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
21/2	65	31 7/8	810	28 3/4	730	16 5/8	422	12	305	7 1/4	184	17 3/4	451	15 3/8	391	8	203	9 3/4	248	8 5/8	219
3	80	32 7/8	835	29 3/8	746	16 5/8	422	12	305	7 1/4	184	20 1/4	514	17	432	8	203	9 3/4	248	8 5/8	219
4	100	34 7/8	886	30 1/4	768	16 5/8	422	12	305	8	203	22 1/2	572	18 1/4	464	9 1/8	232	9 3/4	248	8 5/8	219
6	150	43 1/2	1105	36 1/2	927	22 1/4	565	10 1/2	267	10	254	30 1/2	775	24 1/4	616	10 1/8	257	10 3/4	273	11 1/4	286
8	200	52 3/4	1340	45 3/4	1162	29 1/2	749	15 1/8	384	11	279	37	940	28 1/2	724	18 1/2	470	15 5/8	397	13 1/4	337
10	250	55 3/4	1416	49 3/4	1264	29 1/2	749	15 1/8	384	12	305	45 5/8	1159	34 3/4	883	18 1/2	470	15 5/8	397	13 1/4	337

FLOW CHARACTERISTICS

MODEL 375ASTDA 2 1/2", 3" & 4" (STANDARD & METRIC)



MODEL 375ASTDA 6", 8" & 10" (STANDARD AND METRIC)

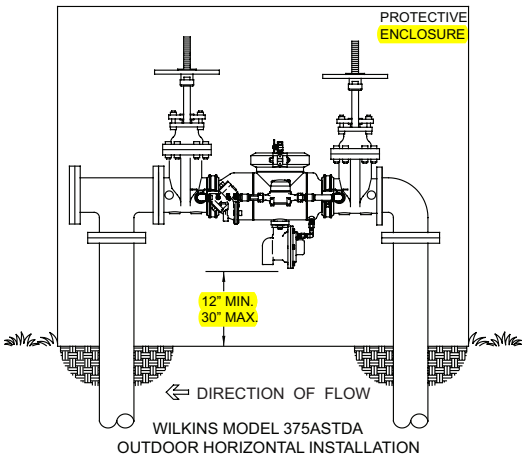


◇ Rated Flow (Established by approval agencies)

TYPICAL INSTALLATION

Local codes shall govern installation requirements. To be installed in accordance with the manufacturer's instructions and the latest edition of the Uniform Plumbing Code. Unless otherwise specified, the assembly shall be mounted at a minimum of 12" (305mm) and a maximum of 30" (762mm) above adequate drains with sufficient side clearance for testing and maintenance. The installation shall be made so that no part of the unit can be submerged.

Capacity thru Schedule 40 Pipe (GPM)				
Pipe size	5 ft/sec	7.5 ft/sec	10 ft/sec	15 ft/sec
2 1/2"	75	112	149	224
3"	115	173	230	346
4"	198	298	397	595
6"	450	675	900	1351
8"	780	1169	1559	2339
10"	1229	1843	2458	3687
12"	1763	2644	3525	5288



WILKINS MODEL 375ASTDA
OUTDOOR HORIZONTAL INSTALLATION

SPECIFICATIONS

The Reduced Pressure Detector Backflow Prevention Assembly shall be ASSE® Listed 1047, and supplied with full port OS & Y gate valves. The main body and access cover shall be 304L Stainless Steel, the seat ring and check valve shall be NORYL™, the stem shall be stainless steel (ASTM A 276) and the seat disc elastomers shall be EPDM. The checks and the relief valve shall be accessible for maintenance without removing the device from the line. The Reduced Pressure Detector Backflow Prevention Assembly shall be a WILKINS Model 375ASTDA.

GLOBE FIRE SPRINKLER CORPORATION

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MODEL UMC UNIVERSAL MANIFOLD CHECK ASSEMBLY

(With or Without Control Valve)

GENERAL DESCRIPTION

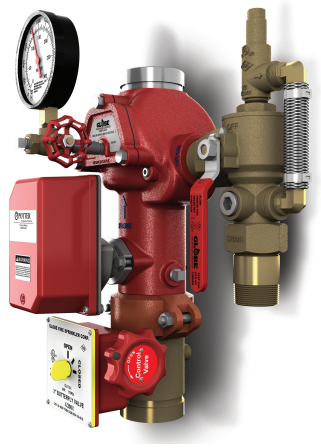
The Globe Series “UMC” Universal Manifold Check is a first of its kind UL Listed and FM Approved complete floor control station or shotgun riser assembly. It is pressure rated for 300 psi (20,6 bar). It provides the most compact “footprint” while delivering all of the necessary components for your floor control station as required by the NFPA Standards. With its multiple available configurations, it allows the contractor to order the suitable configuration for the site specific needs. The “UMC” Universal Manifold Check is more than just a traditional stand-alone manifold. It serves as a complete floor control station as well as a complete shotgun riser assembly inclusive of; Control Valve; Check Valve; Flow Switch; Test and Drain Assembly; Adjustable Pressure Relief Valve Assembly pre-piped to drain; supply gauge (4" and 6") and system gauge (1 1/4" through 6"). The “UMC” Universal Manifold Check replaces the need to order individual “Riser Manifolds” plus control valves, check valves, and relief valve kits as all of these components are integrated into the one compact design, saving space as well as the labor to connect these separate components. The design takes into account both “left-hand” and “right-hand” orientations.

FLOOR CONTROL ASSEMBLY

The UMC may be utilized to meet the NFPA 13 requirements for Floor Control Valve Assemblies where there are multistory buildings exceeding two stories in height requiring zoning by floor or whenever separate control and floor zoning is specified. The UMC has been engineered with space savings in mind for those commonly installed applications in stairwell landings and small alcoves. All UMC assemblies include the NFPA 13 required Listed Pressure Relief Valve which is pre-piped to drain. The relief valve is preset for 175 psi and is adjustable to 310 psi for high pressure system conditions. In addition to the relief valve, the UMC is equipped with a Test and Drain Valve. The Test and Drain Valve contains a test orifice of K2.8 so that it may be utilized for flow testing any system with sprinklers having K-Factors of 2.8 or larger.

Note: NFPA 13 requires that a test connection providing a flow rate equal to or less than one sprinkler of a type having the smallest orifice on the system is to be provided.

A pressure gauge is provided above the check valve clapper for sizes 1 ¼” through 3” to meet the gauge requirement per NFPA 13 for Floor Control Assemblies. Typically the supply side gauge is not required for multistory buildings with floor control stations as a system gauge would be on the main feed/riser but all Model UMC Manifold Check Valves are equipped with a 1/4" (DN 8) port below the clapper to accommodate a second gauge if desired.



MODEL UMC UNIVERSAL MANIFOLD CHECK ASSEMBLY

SHOTGUN RISER ASSEMBLY

“Shotgun Riser Assemblies” are those assemblies which are typically installed in vertical orientations on individual system Risers. The Globe “Shotgun” Riser Manifold Assembly is available in 4 inch (DN 100) and 6 inch (DN 150) sizes and is equipped with a control valve; check valve; flow switch; test and drain valve with NFPA required pressure relief valve; 2 gauges (system and supply). Sizes 4 in (DN 100) and 6 in (DN 150) are equipped with a pressure gauge on both system side and supply side of the check valve clapper.

TECHNICAL DATA

Approvals

- cULus
- FM

Maximum System Working Pressure

- 300 psi (20.6 Bar)

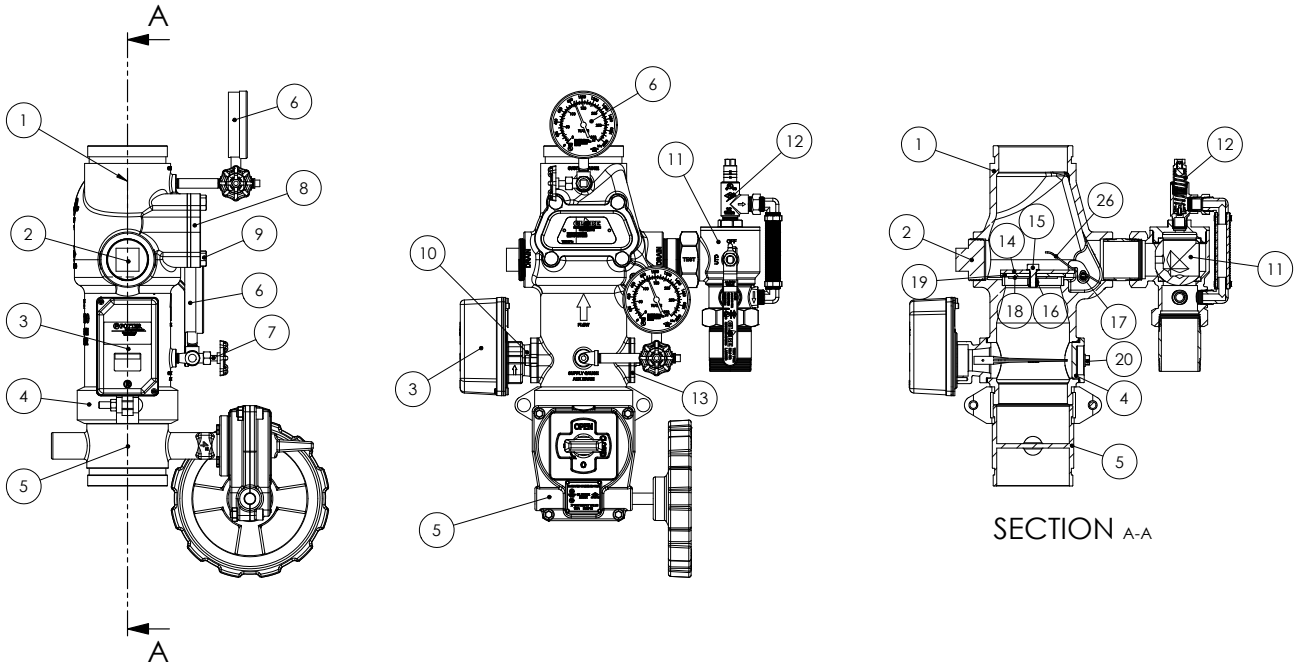
End Connections

- See Table A

Materials of Construction

- See Figure 1

***Multiple Patents Pending**



ITEM NO.	DESCRIPTION	MATERIAL
1	UMC VALVE BODY	DUCTILE IRON
2	RECESSED HEX PLUG	STAINLESS STEEL
3	FLOW SWITCH	SEE FLOW SWITCH TECHNICAL LITERATURE
4	RIGID COUPLING	SEE COUPLING TECHNICAL LITERATURE
5	BUTTERFLY CONTROL VALVE	SEE BUTTERFLY CONTROL VALVE TECHNICAL LITERATURE
6	PRESSURE GAUGE	PLASTIC
7	THREEWAY VALVE	BRONZE
8	UMC COVER PLATE	DUCTILE IRON
9	BOLT	STAINLESS STEEL
10	FLOW SWITCH ADAPTER	DUCTILE IRON
11	MODEL UTD TEST AND DRAIN	SEE GLOBE TECHNICAL DATASHEET GFV570
12	MODEL ARV ADJUSTABLE RELIEF VALVE	SEE GLOBE TECHNICAL DATASHEET GFV575
13	FLOW SWITCH PLUG	DUCTILE IRON
14	UMC VALVE CLAPPER	STAINLESS STEEL
15	UMC VALVE CLAPPER RETAINING BOLT	STAINLESS STEEL
16	UMC VALVE CLAPPER RETAINING NUT	STAINLESS STEEL
17	UMV VALVE HINGE PIN	STAINLESS STEEL
18	CLAPPER FACING RETAINING RING	STAINLESS STEEL
19	CLAPPER FACING	EDPM
20	FLOW SWITCH PLUG BOLT	STAINLESS STEEL

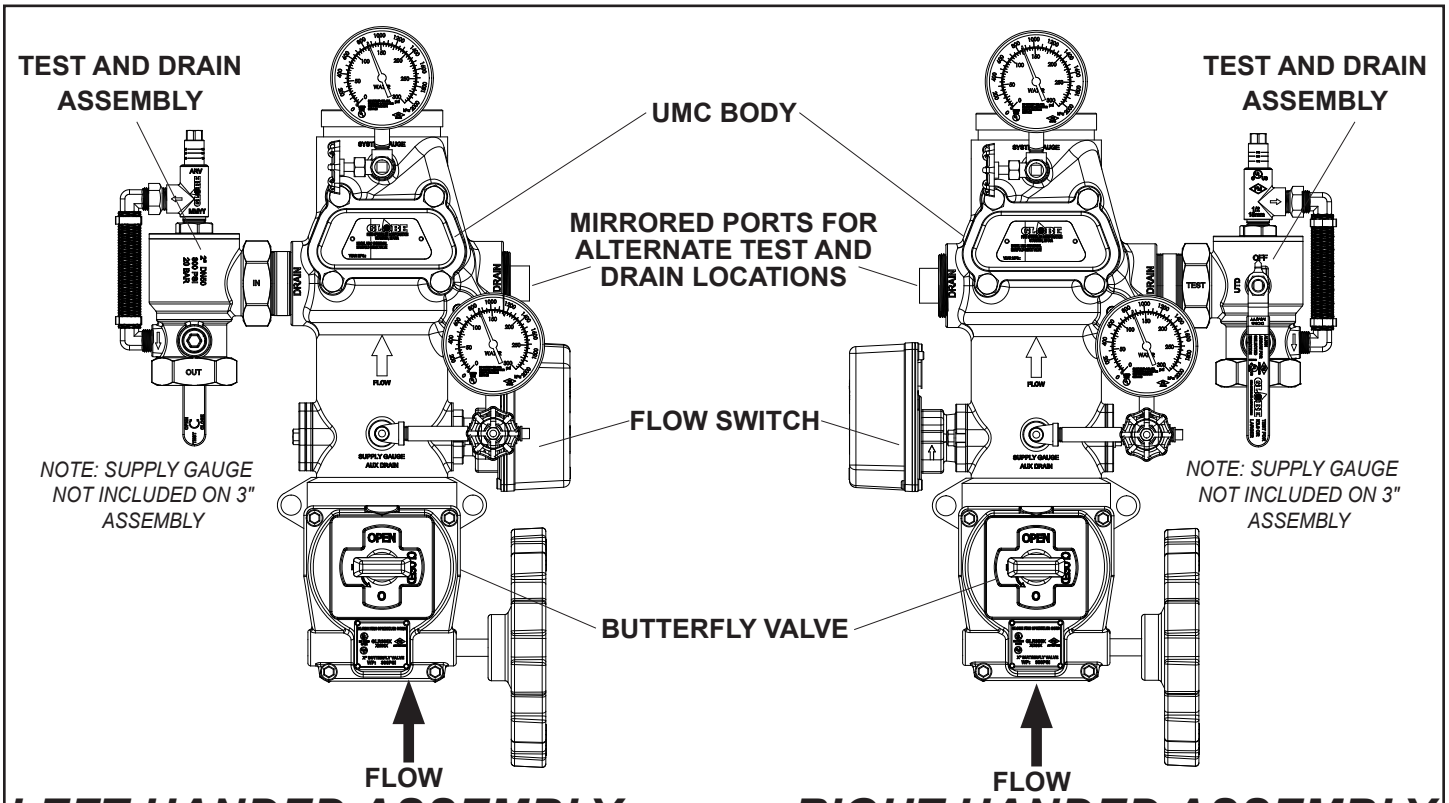
NOTE:

- 4" (DN100) shown as reference
- See ordering procedure for replacement part kits and Table A through G for part numbers for all sizes and configurations
- Flow switch rotated 90 degrees on 1-1/4" through 2 1/2" sizes

FIGURE 1: MODEL UMC MANIFOLD CHECK ASSEMBLY MATERIALS OF CONSTRUCTION

MODEL UMC MANIFOLD CHECK VALVE ASSEMBLY LEFT HANDED VS RIGHT HANDED

Both the shotgun riser assembly and the floor control station assembly are available as left handed or right handed assembly. The determining factor of the left handed vs right handed is the position of the Model UTD Test and Drain. While looking at the faceplate with the Model UMC valve in the vertical orientation and flow upward (shotgun riser orientation), the position of the Model UTD Test and Drain determines the "Hand" of the valve. If the Model UTD Test and Drain is connected to the port on the right side of the valve body, it is considered a right handed assembly. If the Model UTD Test and Drain is connected to the port on the left side of the Model UMC valve the assembly is considered left handed.



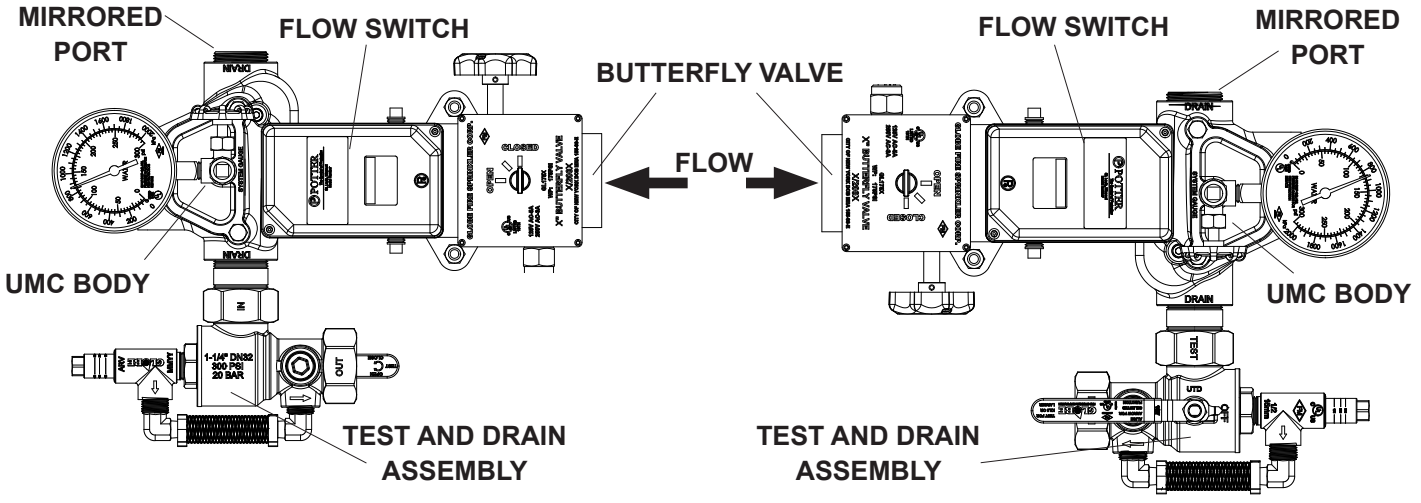


FIGURE 2: MODEL UMC MANIFOLD CHECK VALVE ASSEMBLY LEFT HANDED VS RIGHT HANDED

TABLE A: 1 1/4" MODEL UMC ASSEMBLY CONFIGURATIONS

SIZE	ASSEMBLY R-RIGHT L-LEFT	CONTROL VALVE	UMC BODY END CONNECTIONS	MODEL UTD TEST AND DRAIN SIZE	PART NUMBER
1 1/4"	R	GL300T	MXF THREADED	1"	317800-R-B
1 1/4"	R	NONE	MXF THREADED	1"	317800-R
1 1/4"	L	GL300T	MXF THREADED	1"	317800-L-B
1 1/4"	L	NONE	MXF THREADED	1"	317800-L
1 1/4"	R	NONE	GXG	1"	317843-R
1 1/4"	L	NONE	GXG	1"	317843-L

TABLE B: 1 1/2" MODEL UMC ASSEMBLY CONFIGURATIONS

SIZE	ASSEMBLY R-RIGHT L-LEFT	CONTROL VALVE	UMC BODY END CONNECTIONS	MODEL UTD TEST AND DRAIN SIZE	PART NUMBER
1 1/2"	R	GL300T	MXF THREADED	1"	317803-R-B
1 1/2"	R	NONE	MXF THREADED	1"	317803-R
1 1/2"	L	GL300T	MXF THREADED	1"	317803-L-B
1 1/2"	L	NONE	MXF THREADED	1"	317803-L
1 1/2"	R	NONE	GXG	1"	317844-R
1 1/2"	L	NONE	GXG	1"	317844-L

TABLE C: 2" MODEL UMC ASSEMBLY CONFIGURATIONS

SIZE	ASSEMBLY R-RIGHT L-LEFT	CONTROL VALVE	UMC BODY END CONNECTIONS	MODEL UTD TEST AND DRAIN SIZE	PART NUMBER
2"	R	GL300G	GXG	1"	317806-R-B
2"	R	NONE	GXG	1"	317806-R
2"	L	GL300G	GXG	1"	317806-L-B
2"	L	NONE	GXG	1"	317806-L

TABLE D: 2 1/2" (65 MM) MODEL UMC ASSEMBLY CONFIGURATIONS

SIZE	ASSEMBLY R-RIGHT L-LEFT	CONTROL VALVE	UMC BODY END CONNECTIONS	MODEL UTD TEST AND DRAIN SIZE	PART NUMBER
2 1/2"	R	GL300G	GXG	1 1/4"	317809-R-B
2 1/2"	R	NONE	GXG	1 1/4"	317809-R
2 1/2"	L	GL300G	GXG	1 1/4"	317809-L-B
2 1/2"	L	NONE	GXG	1 1/4"	317809-L
65 mm	R	GLR300G	GXG	1 1/4"	317809-D-R-B
65 mm	R	NONE	GXG	1 1/4"	317809-D-R
65 mm	L	GLR300G	GXG	1 1/4"	317809-D-L-B
65 mm	L	NONE	GXG	1 1/4"	317809-D-L

TABLE E: 3" (65 MM) MODEL UMC ASSEMBLY CONFIGURATIONS

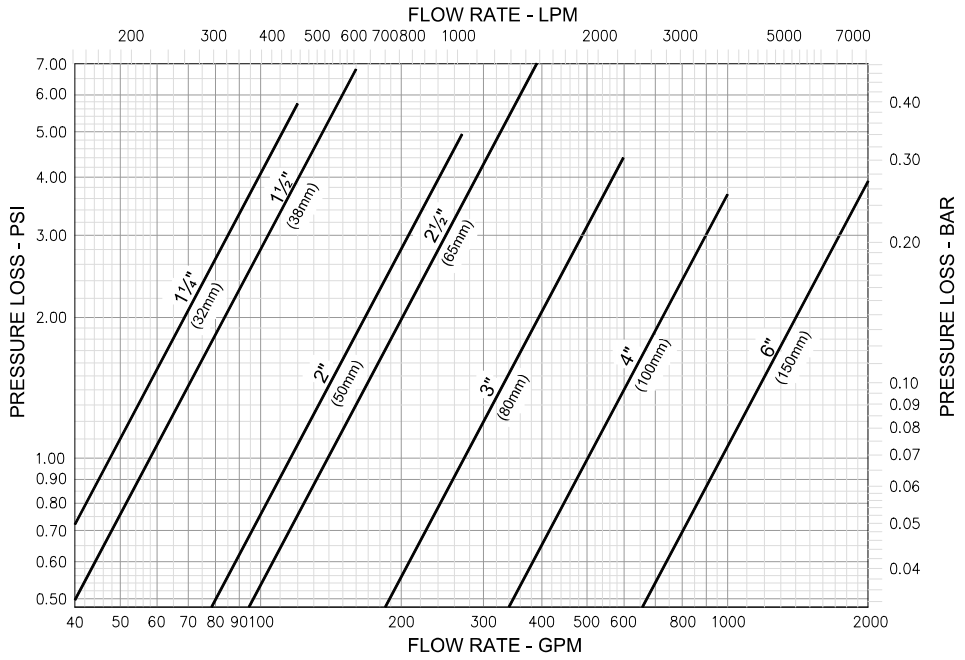
SIZE	ASSEMBLY R-RIGHT L-LEFT	CONTROL VALVE	UMC BODY END CONNECTIONS	MODEL UTD TEST AND DRAIN SIZE	PART NUMBER
3"	R	GLR300G	GXG	1 1/4"	317812-R-B
3"	R	NONE	GXG	1 1/4"	317812-R
3"	L	GLR300G	GXG	1 1/4"	317812-L-B
3"	L	NONE	GXG	1 1/4"	317812-L

TABLE F: 4" MODEL UMC ASSEMBLY CONFIGURATIONS

SIZE	ASSEMBLY R-RIGHT L-LEFT	CONTROL VALVE	UMC BODY END CONNECTIONS	MODEL UTD TEST AND DRAIN SIZE	PART NUMBER
4"	R	GLR300G	GXG	2"	317817-R-B
4"	R	NONE	GXG	2"	317817-R
4"	L	GLR300G	GXG	2"	317817-L-B
4"	L	NONE	GXG	2"	317817-L

TABLE G: 6" (150 MM) MODEL UMC ASSEMBLY CONFIGURATIONS

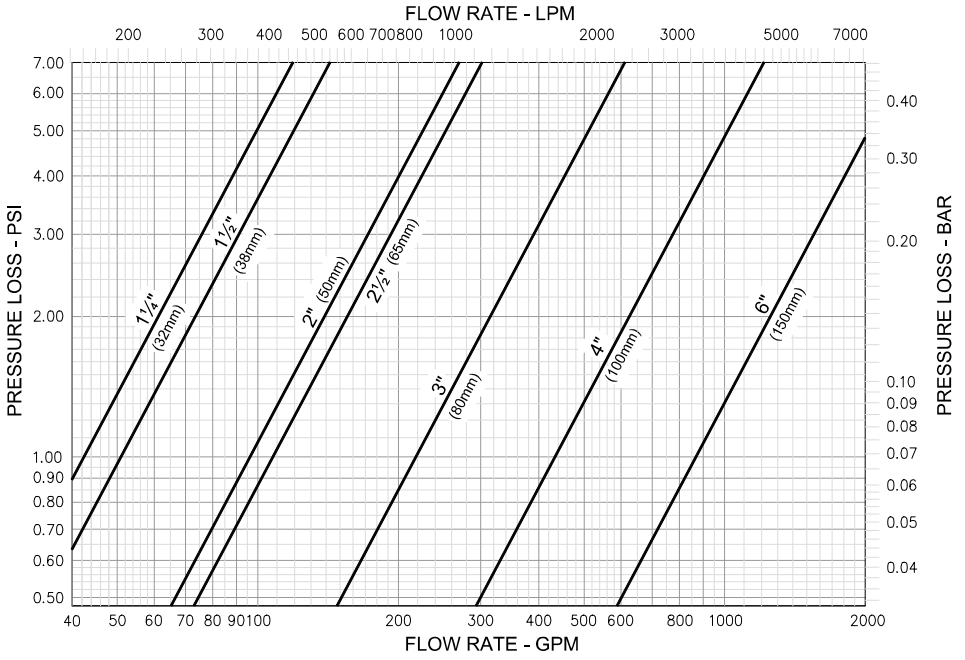
SIZE	ASSEMBLY R-RIGHT L-LEFT	CONTROL VALVE	UMC BODY END CONNECTIONS	MODEL UTD TEST AND DRAIN SIZE	PART NUMBER
6"	R	GLR300G	GXG	2"	317818-R-B
6"	R	NONE	GXG	2"	317818-R
6"	L	GLR300G	GXG	2"	317818-L-B
6"	L	NONE	GXG	2"	317818-L
150 mm	R	GLR300G	GXG	2"	317818-D-R-B
150 mm	R	NONE	GXG	2"	317818-D-R
150 mm	L	GLR300G	GXG	2"	317818-D-L-B
150 mm	L	NONE	GXG	2"	317818-D-L



UMC Equivalent Length of Piping for Friction Losses Through Schedule 40 Pipe

- **1-1/4" = 6 feet**
- **1-1/2" = 9 feet**
- **2" = 8 feet**
- **2-1/2" = 14 feet**
- **3" = 11 feet**
- **4" = 14 feet**
- **6" = 30 feet**

FIGURE 3: MODEL UMC MANIFOLD CHECK (WITHOUT BFV) FRICTION LOSS CURVES 1 1/4" TO 6"



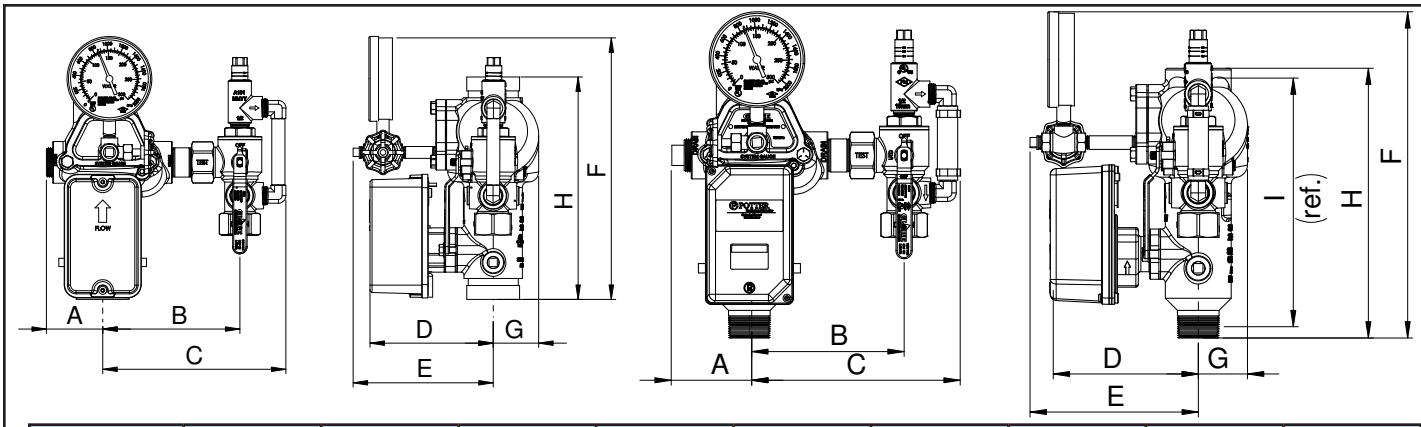
UMC Equivalent Length of Piping for Friction Losses Through Schedule 40 Pipe

- **1-1/4" = 8 feet**
- **1-1/2" = 11 feet**
- **2" = 12 feet**
- **2-1/2" = 22 feet**
- **3" = 17.5 feet**
- **4" = 18.5 feet**
- **6" = 38 feet**

FIGURE 4: MODEL UMC MANIFOLD CHECK (WITH BFV) ASSEMBLY FRICTION LOSS CURVES 1 1/4" TO 6"

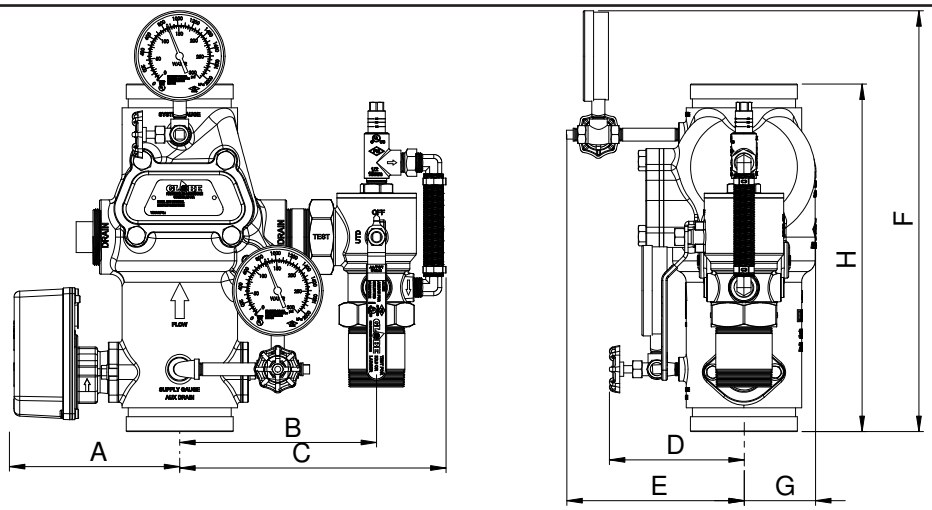
TABLE H: MODEL UMC AND BUTTERFLY VALVE END TO END DIMENSIONS

Size	End to End Dimension Without Butterfly Control Valve	End to End Dimension With Globe Butterfly Control Valve	Globe Butterfly Control Valve End to End Dimension
1 1/4" MT x FT	10.75 (273)	12.89 (327)	2.64 (67.9)
1 1/2" MT x FT	10.75 (273)	13.12 (333)	2.87 (73)
2" G x G	10 (254)	14.49 (368)	4.49 (114)
2 1/2" G x G	10.63 (270)	15.12 (384)	4.49 (114)
65 mm G x G	10.63 (270)	15.12 (384)	4.49 (114)
3" G x G	12.75 (324)	16.55 (420)	3.8 (96.4)
4" G x G	14.63 (371)	19.13 (486)	4.5 (115.4)
6" G x G	17.44 (443)	22.64 (575)	5.2 (132.4)
150 mm	17.44 (443)	22.64 (575)	5.2 (132.4)



SIZE	A	B	C	D	E	F	G	H	I
1 1/4" TXT	3.1 (79)	6.2 (157)	8.4 (214)	6 (150)	6.7 (170)	13 (328)	2 (50)	10.7 (272)	9.5 (241)
1 1/4" GXG	3.1 (79)	6.2 (157)	8.4 (214)	6 (150)	6.7 (170)	11.9 (301)	2 (50)	11.4 (290)	—
1 1/2" TXT	3.1 (79)	6.2 (157)	8.4 (214)	6 (150)	6.7 (170)	13 (328)	2 (50)	10.7 (272)	9.5 (241)
1 1/2" GXG	3.1 (79)	6.2 (157)	8.4 (214)	6 (150)	6.7 (170)	11.9 (301)	2 (50)	11.4 (290)	—
2"	3.9 (99)	5.4 (136)	7.6 (193)	6 (150)	6.8 (173)	11.9 (301)	2.1 (53)	10 (254)	—
2 1/2"	3.3 (84)	6.7 (171)	9.2 (233)	6.2 (157)	7.2 (182)	12.3 (312)	2.3 (58)	10.6 (269)	—
65 mm	3.3 (84)	6.7 (171)	9.2 (233)	6.2 (157)	7.2 (182)	12.3 (312)	2.3 (58)	10.6 (269)	—

FIGURE 5: MODEL UMC ASSEMBLY WITHOUT BFV DIMENSIONAL DRAWING FOR SIZES 1 1/4" TO 2 1/2"



SIZE	A	B	C	D	E	F	G	H
3"	6.5 (165)	6.9 (176)	9.4 (238)	—	6.4 (161)	16 (406)	2.4 (61)	12.7 (324)
4"	7 (177)	8.3 (210)	11.2 (284)	5.6 (143)	7 (178)	17.7 (449)	3 (76)	14.6 (371)
6"	8 (203)	9.5 (241)	12.4 (315)	6.4 (163)	7.9 (201)	19.9 (504)	3.9 (99)	17.5 (444)
150 mm	8 (203)	9.5 (241)	12.4 (315)	6.4 (163)	7.9 (201)	19.9 (504)	3.9 (99)	17.5 (444)

FIGURE 6: MODEL UMC ASSEMBLY WITHOUT BFV DIMENSIONAL DRAWING FOR SIZES 3" TO 6"

FLOW SWITCH REQUIREMENTS

The Model UMC Floor Control/ Shotgun Riser assembly is sold inclusive of a Potter VSR flow switch. The flow switch utilizes exactly the same electrical and switch components as the Potter VSR flow switch but includes an adapter which attaches directly to the Model UMC Manifold Check assembly. This adapter has been tested as part of the UMC assembly to ensure the hydrostatic strength as well as the placement and sensitivity of the paddle is within the criteria set forth by UL and FM.

The part number for the flow switch assembly can be found in the replacement parts section of the technical literature.

The Potter VSR Flow switch includes 2 sets of switches, one set can be used to activate the central fire alarm system while the other set can be utilized to activate a local alarm (if necessary). See figure 7 for a typical wiring diagram for the Model VSR Flow switch.

Note: For more information on the flow switch see www.pottersignal.com.

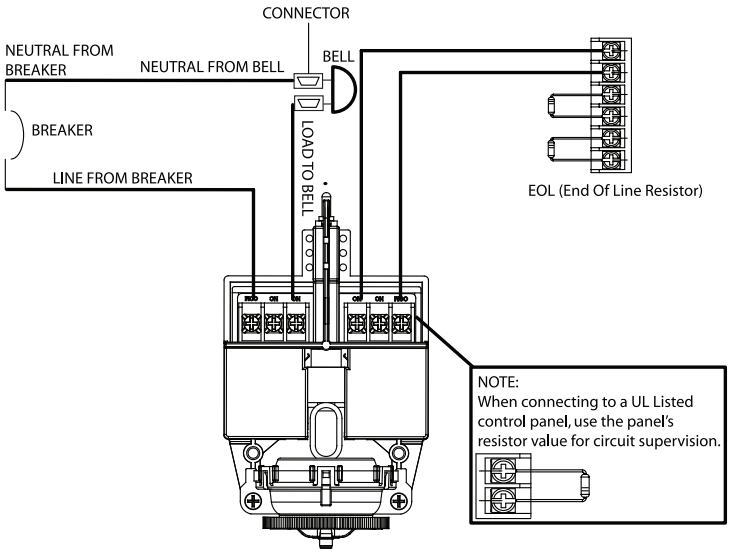


FIGURE 7: MODEL VSR FLOW SWITCH TYPICAL WIRING DIAGRAM

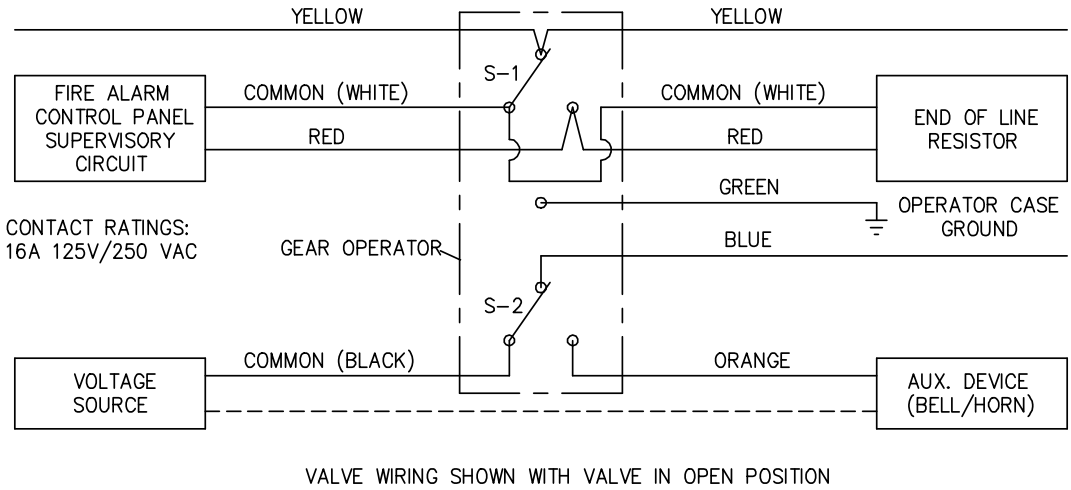


FIGURE 8:TYPICAL BUTTERFLY VALVE WIRING DIAGRAM

INSTALLATION AND MAINTENANCE

INSTALLATION

The Model UMC Floor Control/ Shotgun Riser assembly is sold as a complete unit, assembled and shipped in a single box.

The Model UMC Manifold Check Valve must be installed in an accessible and visible location, which is maintained at or above a minimum temperature of 40ºF (4ºC). The UMC may be installed in the horizontal or vertical (flow upward) orientation.

All valves must be installed in accordance with the appropriate installation standard (i.e. NFPA 13 or other). All electrical connections must be made per the applicable installation standard and/or the National Electric Code (i.e. NFPA 70, NFPA 72 or other).

Proper hydrostatic test procedure must be followed per NFPA 13.

Note: It is not necessary to remove the ARV Relief Valve prior to system hydrostatic test. The Adjustable ARV may simply be temporarily adjusted to a pressure above the test pressure during the hydrostatic test. Be sure to return the ARV Relief Valve to it's normal setting after the completion of the hydrostatic test.

MODEL ARV RELIEF VALVE SETTING PROCEDURE

The Globe 1/2 inch Model ARV, 300 psi Adjustable Pressure Relief Valve, is factory set to relieve at a pressure of approximately 175 psi (12 bar).

The Pressure Relief Valve may be reset to a higher pressure; however, it must be reset to relieve at a pressure which is in accordance with the requirements of the authority having jurisdiction, typically nominal 10 psi (.7 bar) above the expected normal system pressure.

To reset the Model ARV pressure relief valve, use an adjustable crescent wrench, to turn the hex cap clockwise for a higher pressure setting or counter-clockwise for a lower pressure setting. Use the calibrated lines on the stem for an approximate relief pressure setting. 1 full turn of the hex cap will result in approximately 25 psi increase or decrease.

To verify the new setting, isolate the Model ARV relief valve and use a small hydrostatic pump attached to the supply. Increase the pressure at the relief valve to 10 psi above the expected normal system pressure. Readjust the ARV as needed to maintain a 10 psi higher relief setting.

TESTING

Reference NFPA 25, Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.

Before proceeding with any tests involving water flow, the following precautions need to be taken:

STEP 1. Check the location where the test connection discharges to make sure that all is clear and that there is no possibility of the water flow causing damage or injury.

STEP 2. Check the end of the test connection to make sure that it is unobstructed. To achieve a satisfactory test, there must be an unrestricted flow of water when the test valve is wide open.

STEP 3. Check for alarm connections to a central station or fire department. If such connections are found, give proper notice to the signal receiving station before proceeding with the test.

Note: A main drain test may also operate local fire alarms unless they are temporarily disabled.

MAINTENANCE

The owner is responsible for the Inspection, Testing and Maintenance of their fire protection system.

System inspection, testing and maintenance shall be performed in accordance with this section as well as NFPA 25 or other applicable Standard to insure the integrity of the entire system, including alarm functions as well as other system components. Any impairments must be immediately corrected.

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

Note:

All valves should be carefully inspected, tested, and maintained in accordance with NFPA 25 or other applicable Standard.

It is important to ensure a clean water supply free of debris and solid particles such as sand, gravel, or mud.

If, during an inspection of a water control valve, sediment or free particles of matter are noted, a further examination of internal valve parts is necessary.

All deposits should be removed from all operating parts and ports.

Where difficulty in performance is experienced, the manufacturer or its authorized representative shall be contacted before any field adjustment is to be made.

UMC Clapper Facing. The rubber clapper facing should be checked for wear or damage and to determine that it is free of dirt and other foreign substances. If found to be worn or damaged (e.g., foreign matter embedded in the surface; cut or torn facing), the facing should be replaced. If it is dirty, it should be cleaned. Compounds which could damage the rubber facing must never be used. Should clapper facing replacement become necessary, the following steps should be performed;

Note: Before performing the following steps, insure that the system has been depressurized and drained.

Clapper Removal

STEP 1. Remove handhole cover.

STEP 2. Remove hinge pin plugs from front and back of UMC.

STEP 3. Using allen wrench, push hinge pin from back of UMC towards front.

STEP 4. Once hinge pin is accessible, carefully grab with pliers or similar to pull hinge pin out of body.

Note: Care must be taken to confine clapper spring while extracting hinge pin from body. Spring is under tension around hinge pin. It is also recommended to cover drain port to minimize the possibility of spring inadvertently dropping into drain piping.

STEP 5. Carefully remove clapper assembly from UMC.

Clapper Replacement. When replacing clapper, be sure clapper spring has been properly positioned around hinge pin such that tension is applied to the clapper by the spring.

Seat Ring. The seat ring should be checked for nicks and for stones, dirt or other foreign matter. It should be cleaned thoroughly. If the seat ring is found to be damaged, UMC should be replaced.

Water Flow Switch (VSR-M). There is no maintenance required, only periodic testing and inspection. Should switch be found to be malfunctioning, refer to Potter Signal Technical Literature for guidance.

Model ARV Adjustable Relief Valve. Valve is not field serviceable. If inadvertent leakage is observed, first test the pressure setting utilizing the procedure outlined in the ARV Relief Valve Setting Procedure. If valve does not respond to field adjustments, valve shall be replaced.

Note:

Visual calibration lines on valve are used for approximate adjustment. Verify pressure setting with pressure gauge.

Model UTD Universal Test & Drain Valve: The Globe Model UTD Universal Test and Drain Valve does not require any regularly scheduled maintenance. The UTD is not field serviceable. Model ARV Care and Maintenance

ORDERING INFORMATION

MODEL UMC UNIVERSAL MANIFOLD CHECK VALVE ASSEMBLY

Specify: MODEL UMC MANIFOLD CHECK VALVE ASSEMBLY,SIZE (1 1/4", 1 1/2", 2", 2 1/2", 65 mm,3", 4", 6", 150 mm) PN (see Part Number in Table A-G)

REPLACEMENT PARTS

MODEL UMC UNIVERSAL MANIFOLD CHECK VALVE REPLACEMENT PARTS/KITS

VSR FLOW SWITCH with ADAPTER

1 1/4" - 2" 91144802-A
2 1/2" 91144825-A
3" 91144803-A
4" 91144804-A
6" 91144806-A

MODEL UTD TEST AND DRAIN

(SEE GFV-570 for more information)

Specify: MODEL UTD TEST AND DRAIN WITH RELIEF VALVE,SIZE (1", 1 1/4", or 2") PN:

1" (DN25) 311729
1 1/4"(DN32) 311730
2" (DN50) 311731

Specify: MODEL UTD TEST AND DRAIN,SIZE (1", 1 1/4", or 2") PN:

1"(DN25) 311704
1 1/4"(DN32) 312368
2"(DN50) 311708

MODEL ARV RELIEF VALVE

(SEE GFV-575 for more information)

Specify: MODEL ARV 1/2" ADJ RELEIF VALVE PN.

. 317900

Note:

300 psi (20.6 Bars) Pressure Gauges Standard (600 psi (41.2 Bars) Ordered Separately

PN 300121-D

GLOBE® PRODUCT WARRANTY

Globe agrees to repair or replace any of its own manufactured products found to be defective in material or workmanship for a period of one year from date of shipment.

For specific details of our warranty please refer to Price List Terms and Conditions of Sale (Our Price List).

FOR FDC

GLOBE FIRE SPRINKLER CORPORATION

SWING CHECK VALVE STANDARD & "SHOTGUN" MODEL RCV GROOVE/GROOVE 2", 2 ½", 65MM, 3", 4", 6", & 150MM SIZES

DESCRIPTION AND OPERATION

Globe Model RCV Swing Check Valves feature a swing type clapper designed for use in fire sprinkler or other types of water piping systems that incorporate grooved connecting pipe ends. They are effectively used when it is necessary to permit water flow in one direction only, preventing flow in the reverse direction (non-return). Because the RCV incorporates a spring-loaded clapper assembly, it may be installed in either the vertical or horizontal position. Most commonly, it is used with various configurations of fire department connections for fire sprinkler systems, by-pass connections, gravity pressure tank and, pump discharge in connections from public water supplies to automatic sprinkler systems, etc.

As an alternative to using an alarm check valve with a wet sprinkler system, an RCV Swing Check Valve may be used in a "Shotgun" arrangement whereby the valve is trimmed in a similar manner but utilizes an electric water flow switch and alarm bell instead of a water motor gong for fire notification.

The body of the Globe RCV Swing Check Valve is constructed of high tensile strength cast iron having considerable ductility to reduce damage in field handling. It meets the ASTM A126 Class B rating. The RCV clapper assembly is made of stainless steel and has an E.P.D.M. rubber facing. The RCV incorporates a special stainless steel spring assembly which allows its use in the downward flow direction. It effectively provides a leak tight seal against back pressures greater than one (1) psi.

MODEL RCV SWING CHECK VALVE

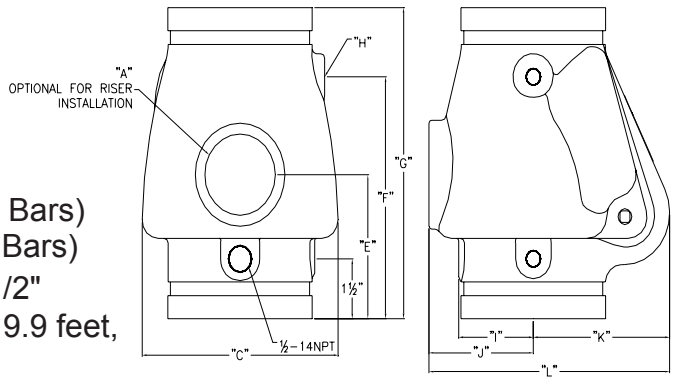
APPROVALS

- cULus Listed
- FM Approved
- NYC-DOB MEA 305-05-E

TECHNICAL DATA

- Water Working Pressure Rating - 300 psi (20.7 Bars)
- Factory tested hydrostatically to 600 PSI (41.4 Bars)
- Equivalent feet of pipe: 2" Valve = 7.2 feet, 2 1/2" Valve = 7.2 feet, 3" Valve = 7.2 feet, 4" Valve - 9.9 feet, 6" Valve = 16.1 feet

PHYSICAL DIMENSIONS



SIZE	A	C	E	F	G	H	I	J	K	L	WEIGHT (lbs.) no trim
2"	1"	4"	3 1/2"	4 1/2"	6 1/2"	1/4"	1 1/2"	2 1/4"	2 1/2"	4 3/4"	4.5
2 1/2"	1 1/4"	4 1/2"	4"	5"	7"	1/4"	1 1/2"	2 1/2"	2 3/4"	5 1/2"	8
65MM	1 1/4"	4 1/2"	4"	5"	7"	1/4"	1 1/2"	2 1/2"	2 3/4"	5 1/2"	8
3"	1 1/4"	5"	4 1/2"	6"	7 3/4"	1/4"	2"	3"	3 3/4"	6 3/4"	12
4"	2"	6 1/4"	4"	6 1/2"	8 1/2"	1/4"	2 1/2"	3 1/2"	4 1/4"	7 1/2"	17.5
6"	2"	8"	5"	8"	10 1/2"	1/4"	3 1/4"	4 1/4"	5 1/2"	10"	40.5
150MM	2"	8"	5"	8"	10 1/2"	1/4"	3 1/4"	4 1/4"	5 1/2"	10"	40.5

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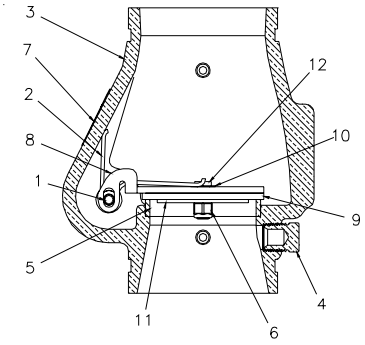
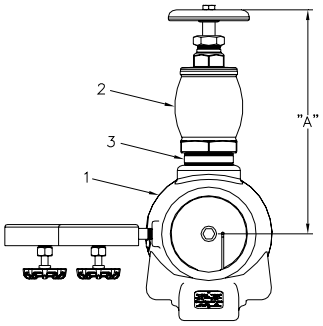
JANUARY 2010
BULLETIN RCV REV. #2

SWING CHECK VALVE - 2",2 ½", 65MM, 3", 4", 6", & 150MM MODEL RCV-STANDARD & "SHOTGUN" GROOVE/GROOVE



CROSS SECTION

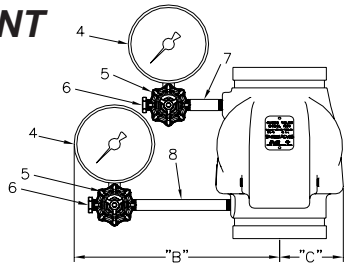
ITEM	DESCRIPTION	MATERIAL	2" P/N	2 ½" P/N 65mm	3" P/N	4" P/N	6" P/N 150mm
1	Hinge Pin	Stainless Steel	321521	321528	321535	321541	321549
2	Torsion Spring	Stainless Steel	321523	321531	321531	321545	321554
3	Machined Body (DIN)	Cast Iron	321501	321503 (321503-D)	321505	321507	321509 (321509-D)
4	1/2" NPT Plug	Cast Iron	311003	311003	311003	311003	311003
5	Seat Ring	Brass	321522	321530	321537	321543	321551
6	Locknut	Stainless Steel	321556	321556	321556	321556	321556
7	Nameplate	Aluminum	321558	321558	321558	321558	321558
8	Clapper	Stainless Steel	321515	321527	321534	321540	321548
9	Clapper Facing Disc	EPDM	321516	321529	321536	321542	321550
10	Sealing Washer	Hard Fiber	321518	321518	321518	321518	321518
11	Disc Retainer	Stainless Steel	321517	321517	321517	321544	321544
12	Hex Head Bolt	Stainless Steel	321519	321519	321555	321555	321559



TOP VIEW

"SHOTGUN" TRIM ARRANGEMENT

SIZE	A	B	C
2"	10"	8 3/4"	2 1/4"
2 1/2"	11"	9 1/4"	2 1/4"
65mm	11"	9 1/4"	2 1/4"
3"	12"	9 1/2"	2 1/2"
4"	13 1/2"	10"	3 1/4"
6"	14 1/4"	10 3/4"	4"
150mm	14 1/4"	10 3/4"	4"



FRONT VIEW

ITEM	DESCRIPTION	2" (DIN 50)	2 ½"	65mm (76mm Groove)	3" (DIN 80)	4" (DIN 100)	6"	150mm (165mm Groove)	QTY.
1	RCV	321526	321533	321533-D	321539	321547	321557	321557-D	1
2	Angle Valve	311614 (1")	311615 (1 1/4")	311615 (1 1/4")	311615 (1 1/4")	311617 (2")	311617 (2")	311617 (2")	1
3	Close Nipple	310500 (1")	310600 (1 1/4")	310600 (1 1/4")	310600 (1 1/4")	310800 (2")	310800 (2")	310800 (2")	1
4	1/4" Water Gauge	300119	300119	300119	300119	300119	300119	300119	2
5	1/4" 3 Way Valve	311683	311683	311683	311683	311683	311683	311683	2
6	1/4" Plug	311001	311001	311001	311001	311001	311001	311001	2
7	1/4" Nipple	311101 (1 1/2")	311102 (2")	311102 (2")	310102 (2")	310103 (2 1/2")	310103 (2 1/2")	310103 (2 1/2")	1
8	1/4" x 5 1/2" Nipple	310109	310109	310109	310109	310109	310109	310109	1

ORDERING INFORMATION

SPECIFY

- Quantity • Model Number
- Standard or Shotgun style.

GLOBE FIRE SPRINKLER CORPORATION

GLOBE® PRODUCT WARRANTY

Globe agrees to repair or replace any of its own manufactured products found to be defective in material or workmanship for a period of one year from date of shipment.

For specific details of our warranty please refer to Price List Terms and Conditions of Sale (Our Price List).

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Section 4 – Electrical Components

FLOW SWITCHES AND BUTTERFLY VALVES ARE INTEGRATED INTO THE GLOBE UMC RISER CHECK VALVE ASSEMBLY.

POTTER
The Symbol of Protection

BELLS
PBA-AC & MBA-DC

UL, ULC, and FM Approved

Sizes Available: 6" (150mm), 8" (200mm) and 10" (250mm)

Voltages Available: 24VAC
120VAC
12VDC (10.2 to 15.6) Polarized
24VDC (20.4 to 31.2) Polarized

Service Use: Fire Alarm
General Signaling
Burglar Alarm

Environment: Indoor or outdoor use (See Note 1)
-40° to 150°F (-40° to 66°C)
(Outdoor use requires weatherproof backbox.)

Termination: AC Bells - 4 No. 18 AWG stranded wires
DC Bells - Terminal strip

Finish: Red powder coating

Optional: Model BBK-1 weatherproof backbox
Model BBX-1 deep weatherproof backbox

These vibrating type bells are designed for use as fire, burglar or general signaling devices. They have low power consumption and high decibel ratings. The unit mounts on a standard 4" (101mm) square electrical box for indoor use or on a model BBK-1 weatherproof backbox for outdoor applications. Weatherproof backbox model BBK-1, Stock No. 1500001.

ALL DC BELLS ARE POLARIZED AND HAVE BUILT-IN TRANSIENT PROTECTION:

Size inches (mm)	Voltage	Model Number	Stock Number	Current (Max.)	Typical dB at 10 ft. (3m) (2)	Minimum dB at 10 ft. (3m) (1)
6 (150)	12VDC	MBA126	1750070	.12A	85	76
8 (200)	12VDC	MBA128	1750080	.12A	90	77
10 (250)	12VDC	MBA1210	1750060	.12A	92	78
6 (150)	24VDC	MBA246	1750100	.06A	87	77
8 (200)	24VDC	MBA248	1750110	.06A	91	79
10 (250)	24VDC	MBA2410	1750090	.06A	94	80
6 (150)	24VAC	PBA246	1806024	.17A	91	78
8 (200)	24VAC	PBA248	1808024	.17A	94	77
10 (250)	24VAC	PBA2410	1810024	.17A	94	78
6 (150)	120VAC	PBA1206	1806120	.05A	92	83
8 (200)	120VAC	PBA1208	1808120	.05A	99	84
10 (250)	120VAC	PBA12010	1810120	.05A	99	86

Notes:
1. Minimum dB ratings are calculated from integrated sound pressure measurements made at Underwriters Laboratories as specified in UL Standard 464. UL temperature range is -30° to 150°F (-34° to 66°C).
2. Typical dB ratings are calculated from measurements made with a conventional sound level meter and are indicative of output levels in an actual installation.

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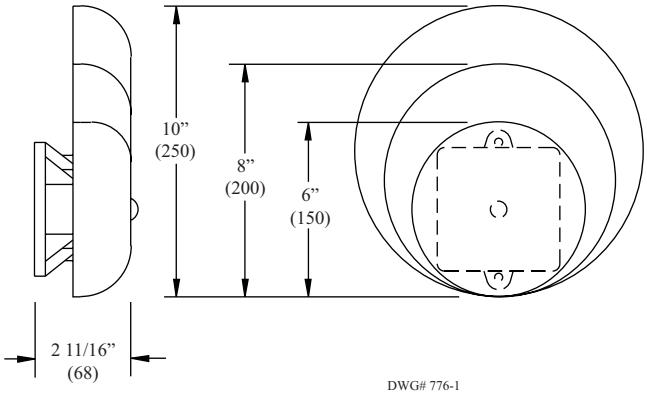
DIMENSIONS
INCHES (mm)

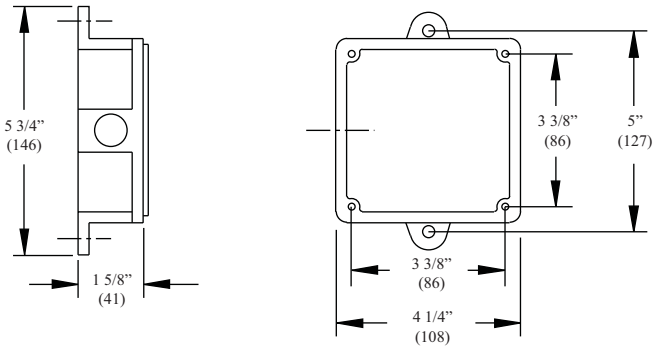
FIG. 1 BELLS



DWG# 776-1

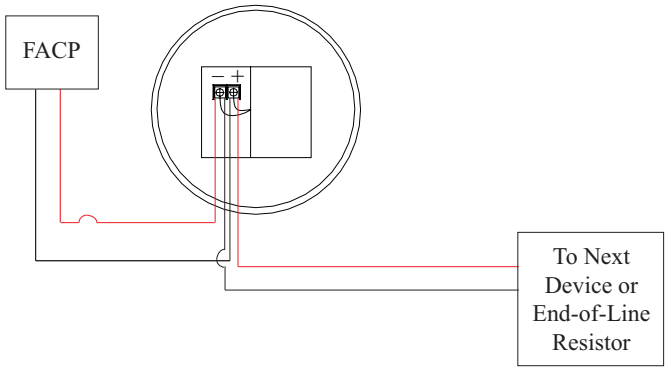
FIG. 2 WEATHERPROOF BACKBOX

BOX HAS ONE THREADED 1/2" CONDUIT ENTRANCE

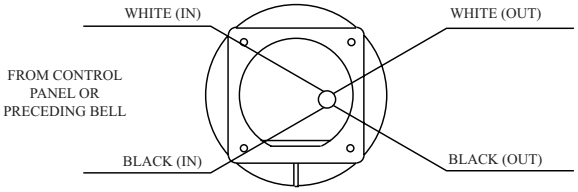


DWG# 776-2

FIG. 3 WIRING (REAR VIEW)



A.C. BELLS



CAUTION:
WHEN ELECTRICAL SUPERVISION IS REQUIRED USE IN AND OUT LEADS AS SHOWN.

NOTES:

1. WHEN USING AC BELLS, TERMINATE EACH EXTRA WIRE SEPARATELY AFTER LAST BELL.
2. END-OF-LINE RESISTOR IS NOT REQUIRED ON AC BELLS.

DWG# 776-3

INSTALLATION

1. The bell shall be installed in accordance with NFPA 13, 72, or local AHJ. The top of the device shall be no less than 90" AFF and not less than 6" below the ceiling.
2. Remove the gong.
3. Connect wiring (see Fig. 3).
4. Mount bell mechanism to backbox (bell mechanism must be mounted with the striker pointing down).
5. Reinstall the gong (be sure that the gong positioning pin, in the mechanism housing, is in the hole in the gong).
6. Test all bells for proper operation and observe that they can be heard where required (bells must be heard in all areas as designated by the authority having jurisdiction).

Section 5 – Hangers

The following excerpt are pages from the North American Product Technical Guide, Volume 2: Anchor Fastening, Edition 17.

Please refer to the publication in its entirety for complete details on this product including data development, product specifications, general suitability, installation, corrosion and spacing and edge distance guidelines.
US: http://submittals.us.hilti.com/PTGVol2/
CA: http://submittals.us.hilti.com/PTGVol2CA/

To consult directly with a team member regarding our anchor fastening products, contact Hilti's team of technical support specialists between the hours of 7:00am – 6:00pm CST.
US: 877-749-6337 or HNATechnicalServices@hilti.com
CA: 1-800-363-4458, ext. 6 or CATechnicalServices@hilti.com

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KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

3.3.6.1 Product description

KWIK HUS-EZ (KH-EZ) anchors are comprised of a body with hex washer head. The anchor is manufactured from carbon steel and is heat treated. It has a minimum 0.0003 inch (8 µm) zinc coating in accordance with DIN EN ISO 4042. The KWIK HUS-EZ (KH-EZ) system is available in a variety of lengths with diameters of 1/4-, 3/8-, 1/2-, 5/8- and 3/4-in. The hex head is larger than the diameter of the anchor and is formed with serrations on the underside. The anchor body is formed with threads running most of the length of the anchor body. The anchor is installed in a predrilled hole with a powered impact wrench or torque wrench. The anchor threads cut into the concrete on the sides of the hole and interlock with the base material during installation. Applicable base materials include normal-weight concrete, structural lightweight concrete, lightweight concrete over metal deck, and grout-filled concrete masonry.

Guide specifications

Screw anchors shall be KWIK HUS-EZ as supplied by Hilti, Inc. Anchors shall be manufactured from heat treated carbon steel material, zinc plated to a minimum thickness of 8 µm. Anchor head shall display name of manufacturer, product name, diameter and length. Anchors shall be installed using a drill bit of same nominal diameter as anchor.

Product features

- Suitable for seismic and nonseismic loads.
- Quick and easy to install.
- Length and diameter identification clearly stamped on head facilitates quality control and inspection after installation.
- Through fixture installation improves productivity and accurate installation.
- Thread design enables quality setting and exceptional load values in wide variety of base material strengths.
- Anchor is fully removable
- Anchor size is same as drill bit size.
- Suitable for reduced edge distances and spacing.

3.3.6.2 Material specifications

Hilti KWIK HUS-EZ anchors are manufactured from carbon steel. The anchors are bright zinc plated to a minimum thickness of 8 µm.

3.3.6.3 Technical data

3.3.6.3.1 ACI 318-14 Chapter 17 design

The technical data contained in this section are Hilti Simplified Design Tables. The load values were developed using the Strength Design parameters and variables of ESR-3027 and the equations within ACI 318-14 Chapter 17. For a detailed explanation of the Hilti Simplified Design Method, refer to section 3.1.8. Data tables from ESR-3027 are not contained in this section, but can be found on www.icc-es.org or at www.hilti.com.

Listings/Approvals

ICC-ES (International Code Council)
ESR-3027
Cracked and Uncracked Concrete
ESR-3056
Grout-filled concrete masonry
City of Los Angeles
Research Report No. 25897

Independent code evaluation

IBC® / IRC® 2015
IBC® / IRC® 2012
IBC® / IRC® 2009
IBC® / IRC® 2006
IBC® / IRC® 2003

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 1 - Hilti KWIK HUS-EZ specifications[1]

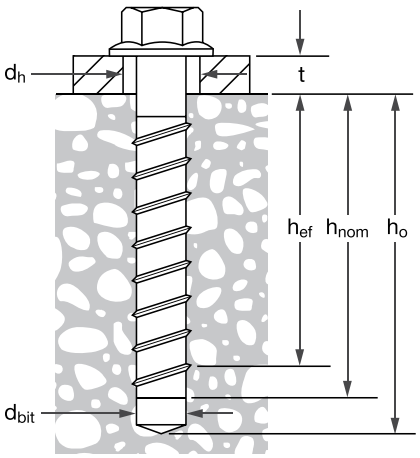
Setting information	Symbol	Units	Nominal anchor diameter											
			1/4		3/8			1/2			5/8		3/4	
Nominal bit diameter	d_{bit}		1/4		3/8			1/2			5/8		3/4	
Minimum nominal embedment	h_{nom}	in.	1-5/8	2-1/2	1-5/8	2-1/2	3-1/4	2-1/4	3	4-1/4	3-1/4	5	4	6-1/4
Minimum effective embedment	h_{ef}	in.	1.18	1.92	1.11	1.86	2.50	1.50	2.16	3.22	2.39	3.88	2.92	4.84
Minimum hole depth	h_o	in.	2	2-7/8	1-7/8	2-3/4	3-1/2	2-5/8	3-3/8	4-5/8	3-5/8	5-3/8	4-4/8	6-5/8
Fixture hole diameter	d_h	in.	3/8		1/2			5/8			3/4		7/8	
Anchor Length = h_{nom} + t	ℓ		See ordering information											
Installation torque concrete	T_{inst}	ft-lb	18		19	40		45			85		115	
		(Nm)	(24)		(26)	(54)		(61)			(115)		(155)	
Maximum impact wrench torque rating concrete[2]	$T_{impact,max}$	ft-lb	114	137	114	450		137	450		450		450	
		(Nm)	(154)	(185)	(154)	(608)		(185)	(608)		(608)		(608)	
Installation torque masonry	T_{inst}	ft-lb	21		22			34			38		70	
		(Nm)	(28)		(30)			(46)			(52)		(95)	
Maximum impact wrench torque rating masonry[2,3]	$T_{impact,max}$	ft-lb	114		114		332	332			332		332	
		(Nm)	(155)		(155)		(450)	(450)			(450)		(450)	
Wrench size		in.	7/16		9/16			3/4			15/16		1-1/8	

1 T_{inst} is the maximum installation torque that may be applied with a torque wrench.

2 Because of variability in measurement procedures, the published torque of an impact tool may not correlate properly with the above setting torques. Over torquing can damage the anchor and/or reduce its holding capacity.

3 For more information on KWIK HUS-EZ installed in masonry, see ESR-3056 and section 3.3.6.3.3.

Figure 1 - Hilti KWIK HUS-EZ specifications



KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

Table 2 - Hilti KWIK HUS-EZ design strength with concrete/pullout failure in uncracked concrete[1,2,3,4,5]

Nominal anchor diameter in.	Nominal embed. in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2,500 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 6,000 psi lb (kN)	f'_c = 2,500 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 6,000 psi lb (kN)
1/4	1-5/8 (41)	585 (2.6)	620 (2.8)	675 (3.0)	765 (3.4)	1,075 (4.8)	1,180 (5.2)	1,360 (6.0)	1,670 (7.4)
	2-1/2 (64)	1,525 (6.8)	1,670 (7.4)	1,930 (8.6)	2,365 (10.5)	2,235 (9.9)	2,450 (10.9)	2,825 (12.6)	3,460 (15.4)
3/8	1-5/8 (41)	910 (4.0)	1,000 (4.4)	1,155 (5.1)	1,415 (6.3)	980 (4.4)	1,075 (4.8)	1,245 (5.5)	1,520 (6.8)
	2-1/2 (64)	1,980 (8.8)	2,165 (9.6)	2,505 (11.1)	3,065 (13.6)	2,130 (9.5)	2,335 (10.4)	2,695 (12.0)	3,300 (14.7)
	3-1/4 (83)	3,085 (13.7)	3,375 (15.0)	3,900 (17.3)	4,775 (21.2)	6,640 (29.5)	7,275 (32.4)	8,400 (37.4)	10,290 (45.8)
1/2	2-1/4 (57)	1,645 (7.3)	1,800 (8.0)	2,080 (9.3)	2,550 (11.3)	1,770 (7.9)	1,940 (8.6)	2,240 (10.0)	2,745 (12.2)
	3 (76)	2,785 (12.4)	3,050 (13.6)	3,525 (15.7)	4,315 (19.2)	3,000 (13.3)	3,285 (14.6)	3,795 (16.9)	4,645 (20.7)
	4-1/4 (108)	5,070 (22.6)	5,555 (24.7)	6,415 (28.5)	7,855 (34.9)	10,920 (48.6)	11,965 (53.2)	13,815 (61.5)	16,920 (75.3)
5/8	3-1/4 (83)	3,240 (14.4)	3,550 (15.8)	4,100 (18.2)	5,025 (22.4)	3,490 (15.5)	3,825 (17.0)	4,415 (19.6)	5,410 (24.1)
	5 (127)	6,705 (29.8)	7,345 (32.7)	8,485 (37.7)	10,390 (46.2)	14,445 (64.3)	15,825 (70.4)	18,270 (81.3)	22,380 (99.6)
3/4	4 (102)	4,380 (19.5)	4,795 (21.3)	5,540 (24.6)	6,785 (30.2)	9,430 (41.9)	10,330 (45.9)	11,930 (53.1)	14,610 (65.0)
	6-1/4 (159)	9,345 (41.6)	10,235 (45.5)	11,820 (52.6)	14,475 (64.4)	20,125 (89.5)	22,045 (98.1)	25,455 (113.2)	31,175 (138.7)

Table 3 - Hilti KWIK HUS-EZ design strength with concrete/pullout failure in cracked concrete[1,2,3,4,5]

Nominal anchor diameter in.	Nominal embed. in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2,500 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 6,000 psi lb (kN)	f'_c = 2,500 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 6,000 psi lb (kN)
1/4	1-5/8 (41)	300 (1.3)	315 (1.4)	345 (1.5)	390 (1.7)	765 (3.4)	835 (3.7)	965 (4.3)	1,180 (5.2)
	2-1/2 (64)	760 (3.4)	830 (3.7)	960 (4.3)	1,175 (5.2)	1,585 (7.1)	1,735 (7.7)	2,000 (8.9)	2,450 (10.9)
3/8	1-5/8 (41)	475 (2.1)	520 (2.3)	600 (2.7)	730 (3.2)	695 (3.1)	760 (3.4)	880 (3.9)	1,080 (4.8)
	2-1/2 (64)	1,400 (6.2)	1,535 (6.8)	1,775 (7.9)	2,170 (9.7)	1,510 (6.7)	1,655 (7.4)	1,910 (8.5)	2,340 (10.4)
	3-1/4 (83)	2,185 (9.7)	2,390 (10.6)	2,765 (12.3)	3,385 (15.1)	4,705 (20.9)	5,155 (22.9)	5,950 (26.5)	7,285 (32.4)
1/2	2-1/4 (57)	1,035 (4.6)	1,135 (5.0)	1,310 (5.8)	1,605 (7.1)	1,115 (5.0)	1,220 (5.4)	1,410 (6.3)	1,725 (7.7)
	3 (76)	1,755 (7.8)	1,920 (8.5)	2,220 (9.9)	2,715 (12.1)	1,890 (8.4)	2,070 (9.2)	2,390 (10.6)	2,925 (13.0)
	4-1/4 (108)	3,190 (14.2)	3,495 (15.5)	4,040 (18.0)	4,945 (22.0)	6,875 (30.6)	7,530 (33.5)	8,695 (38.7)	10,650 (47.4)
5/8	3-1/4 (83)	2,040 (9.1)	2,235 (9.9)	2,580 (11.5)	3,165 (14.1)	2,200 (9.8)	2,410 (10.7)	2,780 (12.4)	3,405 (15.1)
	5 (127)	4,225 (18.8)	4,625 (20.6)	5,340 (23.8)	6,540 (29.1)	9,095 (40.5)	9,965 (44.3)	11,505 (51.2)	14,090 (62.7)
3/4	4 (102)	2,755 (12.3)	3,020 (13.4)	3,485 (15.5)	4,270 (19.0)	5,940 (26.4)	6,505 (28.9)	7,510 (33.4)	9,200 (40.9)
	6-1/4 (159)	5,885 (26.2)	6,445 (28.7)	7,440 (33.1)	9,115 (40.5)	12,670 (56.4)	13,880 (61.7)	16,030 (71.3)	19,630 (87.3)

1 See section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Apply spacing, edge distance, and concrete thickness factors in table 6 to 15 as necessary. Compare to the steel values in table 4. The lesser of the values is to be used for the design

4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: for sand-lightweight, λ_a = 0.68; for all-lightweight, λ_a = 0.60

5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:

1/4-in diameter by 1-5/8-in nominal embedment depth - α_{seis} = 0.60

All other sizes - α_{seis} = 0.75

No reduction needed for seismic shear. See section 3.1.8.7 for additional information on seismic applications.

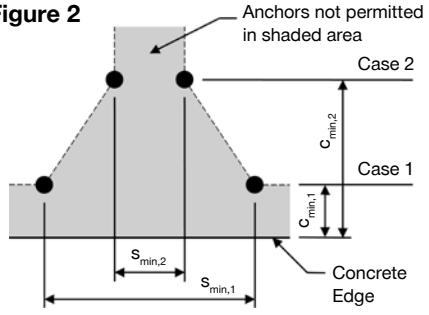
3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 4 - Steel design strength for Hilti KWIK HUS-EZ anchors[1,2]

Nominal anchor diameter in.	Nominal embedment in. (mm)			Tensile ϕN_{sa}[3] lb (kN)	Shear ϕV_{sa}[4] lb (kN)	Seismic shear $\phi V_{sa,eq}$[5] lb (kN)
1/4	1-5/8 (41)	2-1/2 (64)		3,945 (17.5)	930 (4.1)	835 (3.7)
3/8	1-5/8 (41)			5,980 (26.6)	2,200 (9.8)	2,200 (9.8)
	2-1/2 (64)	3-1/4 (83)		6,720 (29.9)	3,110 (13.8)	1,865 (8.3)
1/2	2-1/4 (57)	3 (76)	4-1/4 (108)	11,780 (52.4)	5,545 (24.7)	3,330 (14.8)
5/8	3-1/4 (83)	5 (127)		15,735 (70.0)	6,735 (30.0)	4,040 (18.0)
3/4	4 (102)	6-1/4 (159)		20,810 (92.6)	9,995 (44.5)	6,935 (30.8)

1 See section 3.1.8.6 to convert design strength value to ASD value.
2 KWIK HUS-EZ anchors are to be considered brittle steel elements.
3 Tensile $\phi N_{sa} = \phi A_{se,N} f_{uta}$ as noted in ACI 318-14 Chapter 17.
4 Shear values determined by static shear tests with $\phi V_{sa} < \phi 0.60\ A_{se,V} f_{uta}$ as noted in ACI 318-14 Chapter 17.
5 Seismic shear values determined by seismic shear tests with $\phi V_{sa,eq} < \phi\ 0.60\ A_{se,V} f_{uta}$ as noted in ACI 318-14 Chapter 17. See section 3.1.8.7 for additional information on seismic applications.

Figure 2



For a specific edge distance, the permitted spacing is calculated as follows:

$$s \geq s_{min,2} + \frac{(s_{min,1} - s_{min,2})}{(c_{min,1} - c_{min,2})} (c - c_{min,2})$$

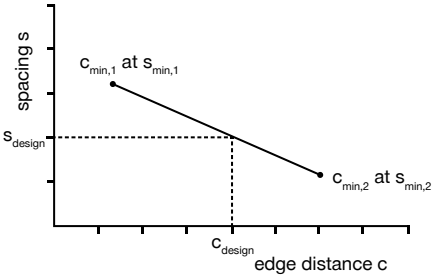


Table 5 - Hilti KWIK HUS-EZ specifications

Setting information	Symbol	Units	Nominal anchor diameter											
			1/4		3/8			1/2			5/8		3/4	
Effective minimum embedment	h_{ef}	in.	1.18	1.92	1.11	1.86	2.50	1.50	2.16	3.22	2.39	3.88	2.92	4.84
Minimum member thickness	h_{min}	in.	3-1/4	4.125	3-1/4	4	4-7/8	4-1/2	4 3/4	6-3/4	5	7	6	8-1/8
Case 1	$c_{min,1}$	in.	1.50					1.75						
	for $s_{min,1} \geq$	in.	3								4			
Case 2	$c_{min,2}$	in.	2	2.78	2.63	2.92	3.75	2.75	3.75	5.25	3.63	5.81	4.41	7.28
	for $s_{min,2} \geq$	in.	1.50		2.25			3						

1 Linear interpolation is permitted to establish an edge distance and spacing combination between Case 1 and Case 2. Linear interpolation for a specific edge .distance c, where $c_{min,1} < c < c_{min,2}$ will determine the permissible spacings.

KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

Table 6 - Load adjustment factors for 1/4-in. diameter Hilti KWIK HUS-EZ in uncracked concrete[1,2]

1/4-in. KH-EZ uncracked concrete			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear				Conc. thickness factor in shear[4] f_{HV}	
									⊥ toward edge f_{RV}		II to and away from edge f_{RV}			
Embedment h_{nom}		in. (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-1/2	(38)	0.71	0.63	0.78	0.65	0.59	0.56	0.40	0.21	0.78	0.42	n/a	n/a
	2	(51)	0.78	0.67	1.00	0.77	0.62	0.58	0.61	0.33	1.00	0.65	n/a	n/a
	2-1/2	(64)	0.85	0.72		0.90	0.65	0.60	0.86	0.46		0.90	n/a	n/a
	3	(76)	0.92	0.76		1.00	0.68	0.62	1.00	0.60		1.00	n/a	n/a
	3-1/4	(83)	0.96	0.78			0.70	0.63		0.68			0.88	n/a
	3-1/2	(89)	0.99	0.80			0.71	0.64		0.76			0.92	n/a
	4	(102)	1.00	0.85			0.74	0.66		0.92			0.98	n/a
	4-1/8	(105)		0.86			0.75	0.66		0.97			1.00	0.81
	4-1/2	(114)		0.89			0.77	0.68		1.00				0.84
	5	(127)		0.93			0.80	0.70						0.89
	5-1/2	(140)		0.98			0.83	0.72						0.93
	6	(152)		1.00			0.86	0.74						0.97
	7	(178)					0.92	0.78						1.00
	8	(203)					0.98	0.82						
	9	(229)					1.00	0.86						
	10	(254)						0.89						
	11	(279)						0.93						
	12	(305)						0.97						
	14	(356)						1.00						

Table 7 - Load adjustment factors for 1/4-in. diameter Hilti KWIK HUS-EZ in cracked concrete[1,2]

1/4-in. KH-EZ cracked concrete			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear				Conc. thickness factor in shear[4] f_{HV}	
									⊥ toward edge f_{RV}		II to and away from edge f_{RV}			
Embedment h_{nom}		in. (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-1/2	(38)	0.71	0.63	0.88	0.65	0.59	0.56	0.40	0.21	0.80	0.43	n/a	n/a
	2	(51)	0.78	0.67	1.00	0.77	0.62	0.58	0.62	0.33	1.00	0.66	n/a	n/a
	2-1/2	(64)	0.85	0.72		0.90	0.65	0.60	0.87	0.46		0.90	n/a	n/a
	3	(76)	0.92	0.76		1.00	0.68	0.62	1.00	0.60		1.00	n/a	n/a
	3-1/4	(83)	0.96	0.78			0.70	0.63		0.68			0.89	n/a
	3-1/2	(89)	0.99	0.80			0.71	0.64		0.76			0.92	n/a
	4	(102)	1.00	0.85			0.74	0.66		0.93			0.98	n/a
	4-1/8	(105)		0.86			0.75	0.66		0.97			1.00	0.81
	4-1/2	(114)		0.89			0.77	0.68		1.00				0.85
	5	(127)		0.93			0.80	0.70						0.89
	5-1/2	(140)		0.98			0.83	0.72						0.93
	6	(152)		1.00			0.86	0.74						0.98
	7	(178)					0.92	0.78						1.00
	8	(203)					0.98	0.82						
	9	(229)					1.00	0.86						
	10	(254)						0.90						
	11	(279)						0.94						
	12	(305)						0.98						
	14	(356)						1.00						

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 8 - Load adjustment factors for 3/8-in. diameter Hilti KWIK HUS-EZ in uncracked concrete[1,2]

3/8-in. KH-EZ uncracked concrete			Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear: ⊥ toward edge f_{RV}			Edge distance in shear: II to and away from edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}		in.	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4
		(mm)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-1/2	(38)	n/a	n/a	n/a	0.58	0.63	0.57	n/a	n/a	n/a	0.49	0.25	0.08	0.58	0.50	0.17	n/a	n/a	n/a
	2	(51)	n/a	n/a	n/a	0.76	0.75	0.66	n/a	n/a	n/a	0.75	0.38	0.13	0.76	0.75	0.26	n/a	n/a	n/a
	2-1/4	(57)	0.84	0.70	0.65	0.86	0.81	0.70	0.65	0.60	0.55	0.90	0.46	0.16	0.90	0.81	0.31	n/a	n/a	n/a
	2-1/2	(64)	0.88	0.72	0.67	0.95	0.88	0.75	0.67	0.61	0.55	1.00	0.54	0.18	1.00	0.88	0.37	n/a	n/a	n/a
	3	(76)	0.95	0.77	0.70	1.00	1.00	0.85	0.71	0.63	0.56	1.00	0.71	0.24	1.00	1.00	0.48	n/a	n/a	n/a
	3-1/4	(83)	0.99	0.79	0.72			0.90	0.72	0.64	0.57		0.80	0.27			0.54	0.95	n/a	n/a
	3-1/2	(89)	1.00	0.81	0.73			0.95	0.74	0.65	0.58		0.89	0.30			0.61	0.98	n/a	n/a
	4	(102)		0.86	0.77			1.00	0.78	0.68	0.59		1.00	0.37			0.74	1.00	0.84	n/a
	4-1/2	(114)		0.90	0.80				0.81	0.70	0.60			0.44			0.88		0.89	n/a
	4-3/4	(121)		0.93	0.82				0.83	0.71	0.60			0.48			0.96		0.91	0.64
	5	(127)		0.95	0.83				0.84	0.72	0.61			0.52			1.00		0.94	0.66
	6	(152)		1.00	0.90				0.91	0.76	0.63			0.68					1.00	0.72
	7	(178)			0.97				0.98	0.81	0.65			0.86						0.78
	8	(203)			1.00				1.00	0.85	0.67			1.00						0.83
	9	(229)								0.90	0.69									0.88
	10	(254)								0.94	0.71									0.93
	11	(279)								0.98	0.74									0.97
	12	(305)								1.00	0.76									1.00
	14	(356)									0.80									
	16	(406)									0.84									
	18	(457)									0.89									
	20	(508)									0.93									
	24	(610)									1.00									

Table 9 - Load adjustment factors for 3/8-in. diameter Hilti KWIK HUS-EZ in cracked concrete[1,2]

3/8-in. KH-EZ cracked concrete			Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear: ⊥ toward edge f_{RV}			Edge distance in shear: II to and away from edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}		in.	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4
		(mm)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-1/2	(38)	n/a	n/a	n/a	0.92	0.66	0.57	n/a	n/a	n/a	0.49	0.25	0.09	0.92	0.50	0.17	n/a	n/a	n/a
	2	(51)	n/a	n/a	n/a	1.00	0.79	0.66	n/a	n/a	n/a	0.76	0.39	0.13	1.00	0.77	0.26	n/a	n/a	n/a
	2-1/4	(57)	0.84	0.70	0.65	1.00	0.85	0.70	0.66	0.60	0.55	0.90	0.46	0.16	1.00	0.85	0.31	n/a	n/a	n/a
	2-1/2	(64)	0.88	0.72	0.67	1.00	0.92	0.75	0.67	0.61	0.55	1.00	0.54	0.18	1.00	0.92	0.37	n/a	n/a	n/a
	3	(76)	0.95	0.77	0.70	1.00	1.00	0.85	0.71	0.63	0.56	1.00	0.71	0.24	1.00	1.00	0.48	n/a	n/a	n/a
	3-1/4	(83)	0.99	0.79	0.72			0.90	0.73	0.64	0.57		0.80	0.27			0.55	0.95	n/a	n/a
	3-1/2	(89)	1.00	0.81	0.73			0.95	0.74	0.65	0.58		0.90	0.31			0.61	0.98	n/a	n/a
	4	(102)		0.86	0.77			1.00	0.78	0.68	0.59		1.00	0.37			0.75	1.00	0.84	n/a
	4-1/2	(114)		0.90	0.80				0.81	0.70	0.60			0.44			0.89		0.89	n/a
	4-3/4	(121)		0.93	0.82				0.83	0.71	0.60			0.48			0.97		0.92	0.64
	5	(127)		0.95	0.83				0.85	0.72	0.61			0.52			1.00		0.94	0.66
	6	(152)		1.00	0.90				0.92	0.77	0.63			0.69					1.00	0.72
	7	(178)			0.97				0.98	0.81	0.65			0.86						0.78
	8	(203)			1.00				1.00	0.85	0.67			1.00						0.83
	9	(229)								0.90	0.69									0.88
	10	(254)								0.94	0.72									0.93
	11	(279)								0.99	0.74									0.97
	12	(305)								1.00	0.76									1.00
	14	(356)									0.80									
	16	(406)									0.85									
	18	(457)									0.89									
	20	(508)									0.93									
	24	(610)									1.00									

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

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Table 10 - Load adjustment factors for 1/2-in. diameter Hilti KWIK HUS-EZ in uncracked concrete[1,2]

1/2-in. KH-EZ uncracked concrete			Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear: ⊥ toward edge f_{RV}			Edge distance in shear: II to and away from edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}		in.	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4
		(mm)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	n/a	0.68	0.57	0.51	n/a	n/a	n/a	0.40	0.25	0.07	0.68	0.50	0.15	n/a	n/a	n/a
	2	(51)	n/a	n/a	n/a	0.75	0.62	0.54	n/a	n/a	n/a	0.48	0.31	0.09	0.75	0.61	0.18	n/a	n/a	n/a
	2-1/2	(64)	n/a	n/a	n/a	0.91	0.71	0.60	n/a	n/a	n/a	0.68	0.43	0.13	0.91	0.71	0.25	n/a	n/a	n/a
	3	(76)	0.83	0.73	0.66	1.00	0.81	0.66	0.65	0.61	0.55	0.89	0.56	0.17	1.00	0.81	0.33	n/a	n/a	n/a
	3-1/2	(89)	0.88	0.77	0.68		0.93	0.73	0.68	0.63	0.56	1.00	0.71	0.21		0.93	0.42	n/a	n/a	n/a
	4	(102)	0.94	0.81	0.71		1.00	0.80	0.71	0.65	0.57		0.87	0.26		1.00	0.52	n/a	n/a	n/a
	4-1/2	(114)	0.99	0.85	0.73			0.87	0.73	0.67	0.58		1.00	0.31			0.62	0.96	n/a	n/a
	4-3/4	(121)	1.00	0.87	0.75			0.91	0.74	0.68	0.58			0.33			0.67	0.99	0.85	n/a
	5	(127)		0.89	0.76			0.95	0.76	0.69	0.58			0.36			0.72	1.00	0.87	n/a
	6	(152)		0.96	0.81			1.00	0.81	0.73	0.60			0.47			0.95		0.95	n/a
	6-3/4	(171)		1.00	0.85				0.85	0.76	0.61			0.57			1.00		1.00	0.68
	7	(178)			0.86				0.86	0.77	0.62			0.60						0.69
	8	(203)			0.91				0.91	0.80	0.64			0.73						0.73
	9	(229)			0.97				0.96	0.84	0.65			0.87						0.78
	10	(254)			1.00				1.00	0.88	0.67			1.00						0.82
	11	(279)								0.92	0.69									0.86
	12	(305)								0.95	0.70									0.90
	14	(356)								1.00	0.74									0.97
	16	(406)									0.77									1.00
	18	(457)									0.80									
	20	(508)									0.84									
	> 24	(610)									0.91									

Table 11 - Load adjustment factors for 1/2-in. diameter Hilti KWIK HUS-EZ in cracked concrete[1,2]

1/2-in. KH-EZ cracked concrete			Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear: ⊥ toward edge f_{RV}			Edge distance in shear: II to and away from edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}		in.	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4
		(mm)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	n/a	0.82	0.66	0.55	n/a	n/a	n/a	0.45	0.28	0.08	0.82	0.57	0.17	n/a	n/a	n/a
	2	(51)	n/a	n/a	n/a	0.90	0.72	0.58	n/a	n/a	n/a	0.55	0.35	0.10	0.90	0.70	0.21	n/a	n/a	n/a
	2-1/2	(64)	n/a	n/a	n/a	1.00	0.83	0.65	n/a	n/a	n/a	0.77	0.49	0.14	1.00	0.83	0.29	n/a	n/a	n/a
	3	(76)	0.83	0.73	0.66	1.00	0.94	0.72	0.67	0.62	0.56	1.00	0.64	0.19	1.00	0.94	0.38	n/a	n/a	n/a
	3-1/2	(89)	0.88	0.77	0.68		1.00	0.79	0.70	0.64	0.56		0.80	0.24		1.00	0.48	n/a	n/a	n/a
	4	(102)	0.94	0.81	0.71		1.00	0.87	0.72	0.66	0.57		0.98	0.29		1.00	0.59	n/a	n/a	n/a
	4-1/2	(114)	0.99	0.85	0.73			0.95	0.75	0.69	0.58		1.00	0.35			0.70	1.00	n/a	n/a
	4-3/4	(121)	1.00	0.87	0.75			0.99	0.77	0.70	0.59			0.38			0.76		0.88	n/a
	5	(127)		0.89	0.76			1.00	0.78	0.71	0.59			0.41			0.82		0.91	n/a
	6	(152)		0.96	0.81			1.00	0.84	0.75	0.61			0.54			1.00		0.99	n/a
	6-3/4	(171)		1.00	0.85				0.88	0.78	0.62			0.64					1.00	0.70
	7	(178)			0.86				0.89	0.79	0.63			0.68						0.72
	8	(203)			0.91				0.95	0.83	0.65			0.83						0.77
	9	(229)			0.97				1.00	0.87	0.67			0.99						0.81
	10	(254)			1.00					0.91	0.68			1.00						0.86
	11	(279)								0.95	0.70									0.90
	12	(305)								0.99	0.72									0.94
	14	(356)								1.00	0.76									1.00
	16	(406)									0.79									
	18	(457)									0.83									
	20	(508)									0.87									
	> 24	(610)									0.94									

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 12 - Load adjustment factors for 5/8-in. diameter Hilti KWIK HUS-EZ in uncracked concrete[1,2]

5/8-in. KH-EZ uncracked concrete			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear				Conc. thickness factor in shear[4] f_{HV}	
									⊥ toward edge f_{RV}		II to and away from edge f_{RV}			
Embedment h_{nom}		in. (mm)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.62	0.51	n/a	n/a	0.24	0.06	0.47	0.13	n/a	n/a
	2	(51)	n/a	n/a	0.67	0.54	n/a	n/a	0.29	0.08	0.57	0.15	n/a	n/a
	2-1/2	(64)	n/a	n/a	0.76	0.59	n/a	n/a	0.40	0.11	0.76	0.21	n/a	n/a
	3	(76)	0.71	0.63	0.86	0.65	0.61	0.55	0.53	0.14	0.86	0.28	n/a	n/a
	3-1/2	(89)	0.74	0.65	0.97	0.70	0.63	0.55	0.66	0.18	0.97	0.35	n/a	n/a
	4	(102)	0.78	0.67	1.00	0.76	0.65	0.56	0.81	0.22	1.00	0.43	n/a	n/a
	4-1/2	(114)	0.81	0.69		0.83	0.66	0.57	0.97	0.26		0.52	n/a	n/a
	5	(127)	0.85	0.71		0.89	0.68	0.58	1.00	0.30		0.60	0.85	n/a
	5-1/2	(140)	0.88	0.74		0.96	0.70	0.58		0.35		0.70	0.89	n/a
	6	(152)	0.92	0.76		1.00	0.72	0.59		0.40		0.80	0.93	n/a
	7	(178)	0.99	0.80			0.75	0.61		0.50		1.00	1.00	0.65
	8	(203)	1.00	0.84			0.79	0.62		0.61				0.69
	9	(229)		0.89			0.83	0.64		0.73				0.74
	10	(254)		0.93			0.86	0.65		0.86				0.78
	11	(279)		0.97			0.90	0.67		0.99				0.81
	12	(305)		1.00			0.94	0.68		1.00				0.85
	14	(356)					1.00	0.71						0.92
	16	(406)						0.74						0.98
	18	(457)						0.77						1.00
	20	(508)						0.80						
	24	(610)						0.86						
	> 30	(762)						0.95						

Table 13 - Load adjustment factors for 5/8-in. diameter Hilti KWIK HUS-EZ in cracked concrete[1,2]

5/8-in. KH-EZ cracked concrete			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear				Conc. thickness factor in shear[4] f_{HV}	
									⊥ toward edge f_{RV}		II to and away from edge f_{RV}			
Embedment h_{nom}		in. (mm)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.63	0.51	n/a	n/a	0.27	0.07	0.53	0.14	n/a	n/a
	2	(51)	n/a	n/a	0.68	0.54	n/a	n/a	0.33	0.09	0.65	0.17	n/a	n/a
	2-1/2	(64)	n/a	n/a	0.77	0.59	n/a	n/a	0.46	0.12	0.77	0.24	n/a	n/a
	3	(76)	0.71	0.63	0.87	0.65	0.62	0.55	0.60	0.16	0.87	0.32	n/a	n/a
	3-1/2	(89)	0.74	0.65	0.98	0.70	0.64	0.56	0.75	0.20	0.98	0.40	n/a	n/a
	4	(102)	0.78	0.67	1.00	0.76	0.66	0.57	0.92	0.25	1.00	0.49	n/a	n/a
	4-1/2	(114)	0.81	0.69		0.83	0.68	0.57	1.00	0.29		0.59	n/a	n/a
	5	(127)	0.85	0.71		0.89	0.70	0.58		0.34		0.69	0.89	n/a
	5-1/2	(140)	0.88	0.74		0.96	0.72	0.59		0.40		0.79	0.93	n/a
	6	(152)	0.92	0.76		1.00	0.74	0.60		0.45		0.90	0.97	n/a
	7	(178)	0.99	0.80			0.78	0.61		0.57		1.00	1.00	0.68
	8	(203)	1.00	0.84			0.82	0.63		0.69				0.72
	9	(229)		0.89			0.86	0.65		0.83				0.77
	10	(254)		0.93			0.89	0.66		0.97				0.81
	11	(279)		0.97			0.93	0.68		1.00				0.85
	12	(305)		1.00			0.97	0.70						0.89
	14	(356)					1.00	0.73						0.96
	16	(406)						0.76						1.00
	18	(457)						0.79						
	20	(508)						0.83						
	24	(610)						0.89						
	> 30	(762)						0.99						

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

Table 14 - Load adjustment factors for 3/4-in. diameter Hilti KWIK HUS-EZ in uncracked concrete[1,2]

3/4-in. KH-EZ uncracked concrete			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear				Conc. thickness factor in shear[4] f_{HV}	
									⊥ toward edge f_{RV}		II to and away from edge f_{RV}			
Embedment h_{nom}		in. (mm)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.57	0.48	n/a	n/a	0.10	0.05	0.19	0.10	n/a	n/a
	2	(51)	n/a	n/a	0.61	0.50	n/a	n/a	0.12	0.06	0.23	0.12	n/a	n/a
	2-1/2	(64)	n/a	n/a	0.68	0.54	n/a	n/a	0.16	0.08	0.33	0.17	n/a	n/a
	3	(76)	0.67	0.60	0.76	0.58	0.56	0.54	0.21	0.11	0.43	0.22	n/a	n/a
	3-1/2	(89)	0.70	0.62	0.84	0.62	0.57	0.55	0.27	0.14	0.54	0.28	n/a	n/a
	4	(102)	0.73	0.64	0.93	0.67	0.58	0.55	0.33	0.17	0.66	0.34	n/a	n/a
	4-1/2	(114)	0.76	0.65	1.00	0.72	0.59	0.56	0.39	0.20	0.79	0.41	n/a	n/a
	5	(127)	0.79	0.67		0.76	0.60	0.56	0.46	0.24	0.92	0.48	n/a	n/a
	5-1/2	(140)	0.81	0.69		0.81	0.61	0.57	0.53	0.28	1.00	0.55	n/a	n/a
	6	(152)	0.84	0.71		0.86	0.62	0.58	0.61	0.31		0.63	0.69	n/a
	7	(178)	0.90	0.74		0.97	0.64	0.59	0.77	0.40		0.79	0.75	n/a
	8	(203)	0.96	0.78		1.00	0.66	0.60	0.94	0.48		0.97	0.80	n/a
	8-1/8	(206)	0.96	0.78			0.66	0.60	0.96	0.50		0.99	0.80	0.65
	9	(229)	1.00	0.81			0.68	0.62	1.00	0.58		1.00	0.85	0.68
	10	(254)		0.84			0.70	0.63		0.68			0.89	0.72
	11	(279)		0.88			0.72	0.64		0.78			0.94	0.75
	12	(305)		0.91			0.74	0.65		0.89			0.98	0.79
	14	(356)		0.98			0.78	0.68		1.00			1.00	0.85
	16	(406)		1.00			0.82	0.71						0.91
	18	(457)					0.86	0.73						0.96
	20	(508)					0.90	0.76						1.00
	24	(610)					0.98	0.81						
	30	(762)					1.00	0.89						
	> 36	(914)						0.96						

Table 15 - Load adjustment factors for 3/4-in. diameter Hilti KWIK HUS-EZ in cracked concrete[1,2]

3/4-in. KH-EZ cracked concrete			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear				Conc. thickness factor in shear[4] f_{HV}	
									⊥ toward edge f_{RV}		II to and away from edge f_{RV}			
Embedment h_{nom}		in. (mm)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.57	0.48	n/a	n/a	0.11	0.06	0.22	0.11	n/a	n/a
	2	(51)	n/a	n/a	0.61	0.50	n/a	n/a	0.13	0.07	0.27	0.14	n/a	n/a
	2-1/2	(64)	n/a	n/a	0.68	0.54	n/a	n/a	0.19	0.10	0.37	0.19	n/a	n/a
	3	(76)	0.67	0.60	0.76	0.58	0.57	0.54	0.24	0.13	0.49	0.25	n/a	n/a
	3-1/2	(89)	0.70	0.62	0.85	0.63	0.58	0.55	0.31	0.16	0.61	0.32	n/a	n/a
	4	(102)	0.73	0.64	0.93	0.67	0.59	0.56	0.38	0.19	0.75	0.39	n/a	n/a
	4-1/2	(114)	0.76	0.65	1.00	0.72	0.60	0.56	0.45	0.23	0.90	0.46	n/a	n/a
	5	(127)	0.79	0.67		0.77	0.61	0.57	0.52	0.27	1.00	0.54	n/a	n/a
	5-1/2	(140)	0.81	0.69		0.81	0.62	0.58	0.60	0.31		0.63	n/a	n/a
	6	(152)	0.84	0.71		0.87	0.63	0.58	0.69	0.36		0.71	0.72	n/a
	7	(178)	0.90	0.74		0.97	0.65	0.60	0.87	0.45		0.90	0.78	n/a
	8	(203)	0.96	0.78		1.00	0.67	0.61	1.00	0.55		1.00	0.83	n/a
	8-1/8	(206)	0.96	0.78			0.68	0.61		0.56			0.84	0.67
	9	(229)	1.00	0.81			0.70	0.63		0.66			0.88	0.71
	10	(254)		0.84			0.72	0.64		0.77			0.93	0.75
	11	(279)		0.88			0.74	0.65		0.89			0.98	0.78
	12	(305)		0.91			0.76	0.67		1.00			1.00	0.82
	14	(356)		0.98			0.80	0.70						0.89
	16	(406)		1.00			0.85	0.72						0.95
	18	(457)					0.89	0.75						1.00
	20	(508)					0.93	0.78						
	24	(610)					1.00	0.84						
	30	(762)						0.92						
	> 36	(914)						1.00						

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 16 - Hilti KWIK HUS-EZ in the soffit of uncracked lightweight concrete over metal deck[1,2,3,4,5,6,7]

Nominal anchor diameter in.	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n		Shear - ϕV_n		Tension - ϕN_n		Shear - ϕV_n	
		f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)
1/4	1-5/8 (41)	545 (2.4)	595 (2.6)	725 (3.2)	725 (3.2)	670 (3.0)	730 (3.2)	725 (3.2)	725 (3.2)
	2-1/2 (64)	1,220 (5.4)	1,410 (6.3)	1,325 (5.9)	1,325 (5.9)	1,275 (5.7)	1,470 (6.5)	1,960 (8.7)	1,960 (8.7)
3/8	1-5/8 (41)	845 (3.8)	975 (4.3)	905 (4.0)	905 (4.0)	970 (4.3)	1,120 (5.0)	2,200 (9.8)	2,200 (9.8)
	2-1/2 (64)	1,455 (6.5)	1,680 (7.5)	905 (4.0)	905 (4.0)	1,900 (8.5)	2,195 (9.8)	3,655 (16.3)	3,655 (16.3)
	3-1/4 (83)	2,550 (11.3)	2,945 (13.1)	2,165 (9.6)	2,165 (9.6)	n/a	n/a	n/a	n/a
1/2	2-1/4 (57)	850 (3.8)	980 (4.4)	965 (4.3)	965 (4.3)	905 (4.0)	1,045 (4.6)	4,710 (21.0)	4,710 (21.0)
	3 (76)	1,990 (8.9)	2,300 (10.2)	1,750 (7.8)	1,750 (7.8)	n/a	n/a	n/a	n/a
	4-1/4 (108)	3,485 (15.5)	4,025 (17.9)	2,155 (9.6)	2,155 (9.6)	n/a	n/a	n/a	n/a
5/8	3-1/4 (83)	2,715 (12.1)	3,135 (13.9)	2,080 (9.3)	2,080 (9.3)	n/a	n/a	n/a	n/a
	5 (127)	6,170 (27.4)	7,125 (31.7)	2,515 (11.2)	2,515 (11.2)	n/a	n/a	n/a	n/a
3/4	4 (102)	2,715 (12.1)	3,135 (13.9)	2,255 (10.0)	2,255 (10.0)	n/a	n/a	n/a	n/a

Table 17 - Hilti KWIK HUS-EZ in the soffit of cracked lightweight concrete over metal deck[1,2,3,4,5,6]

Nominal anchor diameter in.	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n[7]		Shear - ϕV_n[7,8]		Tension - ϕN_n[7]		Shear - ϕV_n[7,8]	
		f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)
1/4	1-5/8 (41)	280 (1.2)	305 (1.4)	725 (3.2)	725 (3.2)	340 (1.5)	370 (1.6)	725 (3.2)	725 (3.2)
	2-1/2 (64)	605 (2.7)	700 (3.1)	1,325 (5.9)	1,325 (5.9)	635 (2.8)	735 (3.3)	1,960 (8.7)	1,960 (8.7)
3/8	1-5/8 (41)	525 (2.3)	605 (2.7)	905 (4.0)	905 (4.0)	770 (3.4)	890 (4.0)	2,200 (9.8)	2,200 (9.8)
	2-1/2 (64)	1,035 (4.6)	1,195 (5.3)	905 (4.0)	905 (4.0)	1,345 (6.0)	1,555 (6.9)	3,655 (16.3)	3,655 (16.3)
	3-1/4 (83)	1,805 (8.0)	2,085 (9.3)	2,165 (9.6)	2,165 (9.6)	n/a	n/a	n/a	n/a
1/2	2-1/4 (57)	535 (2.4)	620 (2.8)	965 (4.3)	965 (4.3)	640 (2.8)	740 (3.3)	4,710 (21.0)	4,710 (21.0)
	3 (76)	1,255 (5.6)	1,450 (6.4)	1,750 (7.8)	1,750 (7.8)	n/a	n/a	n/a	n/a
	4-1/4 (108)	2,195 (9.8)	2,535 (11.3)	2,155 (9.6)	2,155 (9.6)	n/a	n/a	n/a	n/a
5/8	3-1/4 (83)	1,710 (7.6)	1,975 (8.8)	2,080 (9.3)	2,080 (9.3)	n/a	n/a	n/a	n/a
	5 (127)	3,885 (17.3)	4,485 (20.0)	2,515 (11.2)	2,515 (11.2)	n/a	n/a	n/a	n/a
3/4	4 (102)	1,710 (7.6)	1,975 (8.8)	2,255 (10.0)	2,255 (10.0)	n/a	n/a	n/a	n/a

1 See section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is 3 x h_{nom} (nominal embedment).

4 Tabular values are lightweight concrete and no additional reduction factor is needed.

5 No additional reduction factors for spacing or edge distance need to be applied.

6 Comparison to steel values in table 4 is not required. Values in tables 16 and 17 control.

7 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension only by $\alpha_{N,seis}$ = 0.75.
See section 3.1.8.7 for additional information on seismic applications.

8 For the following anchor sizes, an additional factor for seismic shear must be applied to the cracked concrete tabular values for seismic conditions:
1/4-inch diameter - $\alpha_{v,seis}$ = 0.75
3/8-inch diameter - $\alpha_{v,seis}$ = 0.60
1/2-inch diameter - $\alpha_{v,seis}$ = 0.60
5/8-inch diameter - $\alpha_{v,seis}$ = 0.60
3/4-inch diameter - $\alpha_{v,seis}$ = 0.70

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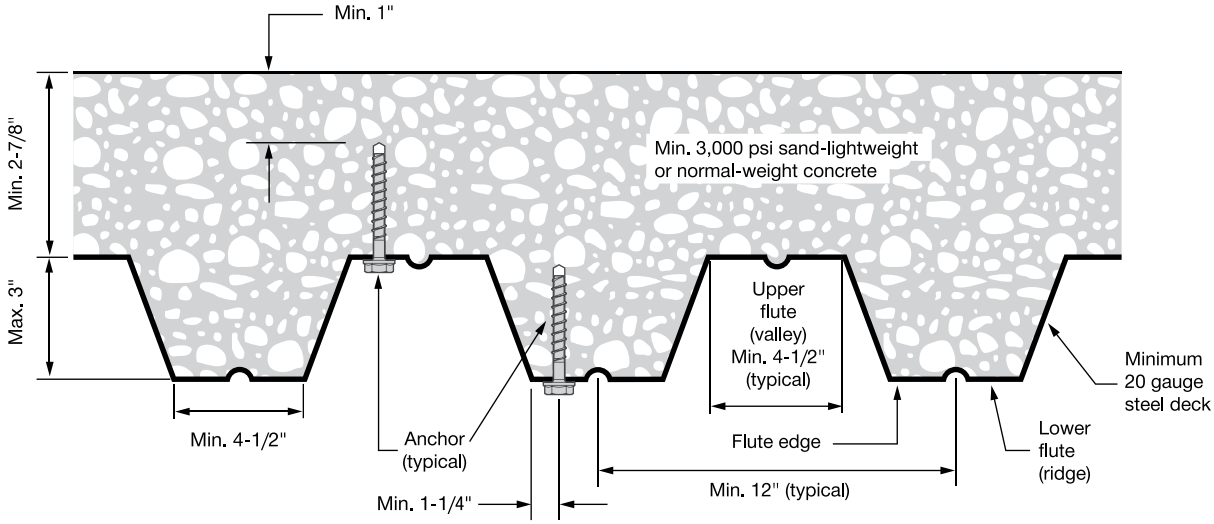
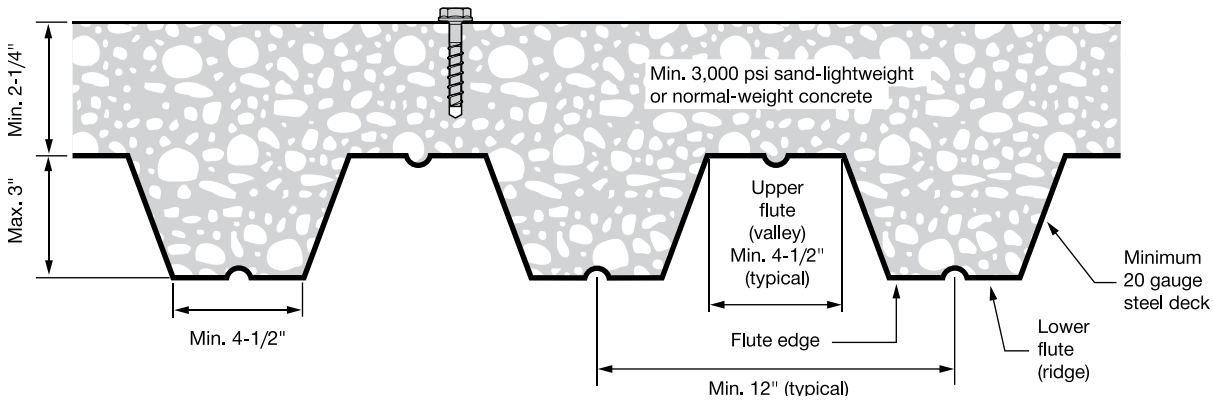
Figure 3 – Installation of Hilti KWIK HUS-EZ (KH-EZ) in soffit of concrete over steel deck floor and roof assemblies[1]



1 Anchors may be placed in the upper or lower flute of the steel deck profile provided the minimum concrete cover above the drilled hole is satisfied. Anchors in the lower flute may be installed with a maximum 1-inch offset in either direction from the center of the flute. The offset distance may be increased proportionally for profiles with lower flute widths greater than those shown provided the minimum lower flute edge distance is also satisfied.

3.3.6

Figure 4 – Installation of Hilti KWIK HUS-EZ on the top of sand-lightweight concrete over metal floor and roof assemblies



3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 18 - Hilti KWIK HUS-EZ in the top of uncracked concrete over metal deck[1,2,3,4,5]

Nominal anchor diameter in.	Nominal embed. depth in. (mm)	Tension - ϕN_n		Shear - ϕV_n	
		f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)
1/4	1-5/8 (41)	620 (2.8)	675 (3.0)	1,180 (5.2)	1,360 (6.0)
3/8	1-5/8 (41)	1,000 (4.4)	1,155 (5.1)	1,075 (4.8)	1,245 (5.5)

Table 19 - Hilti KWIK HUS-EZ in the top of cracked concrete over metal deck[1,2,3,4,5]

Nominal anchor diameter in.	Nominal embed. depth in. (mm)	Tension - ϕN_n		Shear - ϕV_n	
		f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)
1/4	1-5/8 (41)	315 (1.4)	345 (1.5)	835 (3.7)	965 (4.3)
3/8	1-5/8 (41)	520 (2.3)	600 (2.7)	760 (3.4)	880 (3.9)

1 See section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Apply spacing, edge distance, and concrete thickness factors in tables 20 and 21 as necessary. Compare to the steel values in table 4. The lesser of the values is to be used for the design.

4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λa as follows:

for sand-lightweight, λ_a = 0.68; for all-lightweight, λ_a = 0.60

5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:

1/4-inch diameter - $\alpha_{N,seis}$ = 0.60
3/8-inch diameter- $\alpha_{N,seis}$ = 0.75.

No reduction needed for seismic shear. See section 3.1.8.7 for additional information on seismic applications.

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Table 20 - Load adjustment factors for Hilti KWIK HUS-EZ in the top of uncracked concrete over metal deck[1,2]

1/4-in. and 3/8-in. KH-EZ uncracked concrete over metal deck			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear: ⊥ toward edge f_{RV}		Edge distance in shear: II to and away from edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Anchor diameter d_a		in. (mm)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)
Nominal embed. h_{nom}		in. (mm)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.44	0.58	n/a	n/a	0.44	0.58	0.44	0.58	n/a	n/a
	2	(51)	n/a	n/a	0.50	0.67	n/a	n/a	0.50	0.67	0.50	0.67	n/a	n/a
	2-1/2	(64)	n/a	n/a	0.63	0.83	n/a	n/a	0.63	0.83	0.63	0.83	0.78	0.83
	3	(76)	0.92	0.95	0.75	1.00	0.68	0.71	0.75	1.00	0.75	1.00	0.85	0.91
	3-1/4	(83)	0.96	0.99	0.81		0.70	0.72	0.81		0.81			
	3-1/2	(89)	0.99	1.00	0.88		0.71	0.74	0.88		0.88			
	4	(102)	1.00		1.00		0.74	0.78	1.00		1.00			
	4-1/2	(114)					0.77	0.81						
	5	(127)					0.80	0.84						
	5-1/2	(140)					0.83	0.88						
	6	(152)					0.86	0.91						
	6-1/2	(165)					0.89	0.95						
	7	(178)					0.92	0.98						
	7-1/2	(191)					0.95	1.00						
	8	(203)					0.98							
	9	(229)					1.00							

Table 21 - Load adjustment factors for Hilti KWIK HUS-EZ in the top of cracked concrete over metal deck[1,2]

1/4-in. and 3/8-in. KH-EZ uncracked concrete over metal deck			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear: ⊥ toward edge f_{RV}		Edge distance in shear: II to and away from edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Anchor diameter d_a		in. (mm)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)
Nominal embed. h_{nom}		in. (mm)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.99	1.00	n/a	n/a	0.51	0.62	0.99	1.00	n/a	n/a
	2	(51)	n/a	n/a	1.00		n/a	n/a	0.62	0.76	1.00		n/a	n/a
	2-1/2	(64)	n/a	n/a			n/a	n/a	0.87	1.00			0.78	0.83
	3	(76)	0.92	0.95			0.68	0.71	1.00				0.85	0.91
	3-1/4	(83)	0.96	0.99			0.70	0.73						
	3-1/2	(89)	0.99	1.00			0.71	0.74						
	4	(102)	1.00				0.74	0.78						
	4-1/2	(114)					0.77	0.81						
	5	(127)					0.80	0.85						
	5-1/2	(140)					0.83	0.88						
	6	(152)					0.86	0.92						
	6-1/2	(165)					0.89	0.95						
	7	(178)					0.92	0.98						
	7-1/2	(191)					0.95	1.00						
	8	(203)					0.98							
	9	(229)					1.00							

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

- For concrete thickness greater than or equal to 3-1/4-inches, the anchor can be designed using either table 2 or table 3 of this section.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

3.3.6.3.2 Canadian Limit State design

Limit State Design of anchors is described in the provisions of CSA A23.3-14 Annex D for post-installed anchors tested and assessed in accordance with ACI 355.2 for mechanical anchors and ACI 355.4 for adhesive anchors. This section contains the Limit State Design tables with unfactored characteristic loads that are based on the published loads in ICC Evaluation Services ESR-3027. These tables are followed by factored resistance tables. The factored resitance tables have characteristic design loads that are prefactored by the applicable reduction factors for a single anchor with no anchor-to-anchor spacing or edge distance adjustments for the convenience of the user of this document. All the figures in the previous ACI 318-14 Chapter 17 design section are applicable to Limit State Design and the tables will reference these figures.

For a detailed explanation of the tables developed in accordance with CSA A23.3-14 Annex D, refer to Section 3.1.8. Technical assistance is available by contacting Hilti Canada at (800) 363-4458 or at www.hilti.com.

Table 22 - Steel resistance for Hilti KWIK HUS-EZ carbon steel screw anchor[1,2]

Nominal anchor diameter in.	Nominal embedment in. (mm)			Tensile N_{sar} [3] lb (kN)	Shear V_{sar} [4] lb (kN)	Seismic shear $V_{sar,eq}$ [5] lb (kN)
1/4	1-5/8 (41)	2-1/2 (64)		3,370 (15.0)	855 (3.8)	770 (3.4)
3/8	1-5/8 (41)			5,475 (24.4)	2,025 (9.0)	2,025 (9.0)
	2-1/2 (64)	3-1/4 (83)		6,150 (27.4)	2,865 (12.7)	1,720 (7.7)
1/2	2-1/4 (57)	3 (76)	4-1/4 (108)	10,780 (48.0)	5,110 (22.7)	3,065 (13.6)
5/8	3-1/4 (83)	5 (127)		14,405 (64.1)	6,200 (27.6)	3,720 (16.5)
3/4	4 (102)	6-1/4 (159)		19,050 (84.7)	9,205 (40.9)	6,385 (28.4)

1 See section 3.1.8.6 to convert design strength value to ASD value.

2 Hilti KWIK HUS-EZ carbon steel screw anchors are to be considered brittle steel elements.

3 Tensile $N_{sar} = A_{se,N}\ \phi_s\ f_{uta}\ R$ as noted in CSA A23.3-14 Annex D.

4 Shear determined by static shear tests with $V_{sar} < A_{se,V}\ \phi_s\ 0.6\ f_{uta}\ R$ as noted in CSA A23.3-14 Annex D.

5 Seismic shear values determined by seismic shear tests with $V_{sar,eq} < A_{se,V}\ \phi_s\ 0.6\ f_{uta}\ R$ as noted in CSA A23.3-14 Annex D. See section 3.1.8.7 for additional information on seismic applications.

KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

Table 23 - Hilti KWIK HUS-EZ design information in accordance with CSA A23.3-14 Annex D[1]

Design parameter	Symbol	Units	Nominal anchor diameter												Ref
			1/4		3/8			1/2			5/8		3/4		A23.3-14
Nominal anchor diameter	d_a	in. (mm)	0.25 (6.4)		0.375 (9.5)			0.5 (12.7)			0.625 (15.9)		0.75 (19.1)		
Effective embedment[2]	h_{ef}	in. (mm)	1.18 (30)	1.92 (49)	1.11 (28)	1.86 (47)	2.50 (64)	1.52 (39)	2.16 (55)	3.22 (82)	2.39 (61)	3.88 (99)	2.92 (74)	4.84 (123)	
Min. nominal embedment[2]	h_{nom}	in. (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	2-1/4 (57)	3 (76)	4-1/4 (108)	3-1/4 (83)	5 (127)	4 (102)	6-1/4 (159)	
Minimum concrete thickness[3]	h_{min}	in. (mm)	3-1/4 (83)	4-1/8 (105)	3-1/4 (83)	4 (102)	4-3/4 (121)	4-1/2 (114)	4-3/4 (121)	6-3/4 (171)	5 (127)	7 (178)	6 (152)	8-1/8 (206)	
Critical edge distance	c_{ac}	in. (mm)	2 (51)	2.78 (71)	2.63 (67)	2.92 (74)	3.75 (95)	2.75 (70)	3.75 (95)	5.25 (133)	3.63 (92)	5.82 (148)	4.41 (112)	7.28 (185)	
Minimum spacing at critical edge distance	$s_{min,cac}$	in. (mm)	1.5 (38)		2.25 (57)			3 (76)							
Minimum edge distance	c_{min}	in. (mm)	1.50 (38)					1.75 (44)							
Minimum anchor spacing at minimum edge distance	for s >	in. (mm)	3.0 (76)								4 (102)				
Mininimum hole depth in concrete	h_0	in. (mm)	2 (51)	2-7/8 (73)	1-7/8 (48)	2-3/4 (70)	3-1/2 (89)	2-5/8 (67)	3-3/8 (86)	4-5/8 (117)	3-5/8 (92)	5-3/8 (137)	4-3/8 (111)	6-5/8 (168)	
Minimum specified ultimate strength	f_{uta}	psi (N/mm²)	125,000 (860)		106,975 (738)	120,300 (829)		112,540 (776)			90,180 (622)		81,600 (563)		
Effective tensile stress area	$A_{se,N}$	in² (mm²)	0.045 (29.0)		0.086 (55.5)			0.161 (103.9)			0.268 (172.9)		0.392 (252.9)		
Steel embed. material resistance factor for reinforcement	ϕ_s	-	0.85												8.4.3
Resistance modification factor for tension, steel failure modes[4]	R	-	0.70												D.5.3
Resistance modification factor for shear, steel failure modes[4]	R	-	0.65												D.5.3
Factored steel resistance in tension	N_{sar}	lb (kN)	3,370 (15.0)		5,475 (24.4)	6,150 (27.4)		10,780 (48.0)			14,405 (64.1)		19,050 (84.7)		D.6.1.2
Factored steel resistance in shear	V_{sar}	lb (kN)	855 (3.8)		2,030 (9.0)	2,865 (12.7)		5,110 (22.7)			6,200 (27.6)		9,205 (40.9)		D.7.1.2
Factored steel resistance in shear, seismic	$V_{sar,eq}$	lb (kN)	770 (3.4)		2,030 (9.0)	1,720 (7.7)		3,065 (13.6)			3,720 (16.5)		6,385 (28.4)		
Coeff. for factored conc. breakout resistance, uncracked concrete	$k_{c,uncr}$	lb	10					11.25							D.6.2.2
Coeff. for factored conc. breakout resistance, cracked concrete	$k_{c,cr}$	-	7												D.6.2.2
Modification factor for anchor resistance, tension, uncracked concrete[5]	$\psi_{c,N}$	-	1.0												D.6.2.6
Anchor category	-	-	3	1											D.5.3 (c)
Concrete material resistance factor	ϕ_c	-	0.65												8.4.2
Resistance modification factor for tension and shear, concrete failure modes, Condition B[6]	R	-	0.75	1.00											D.5.3 (c)
Factored pullout resistance in 20 MPa uncracked concrete[7]	$N_{pr,uncr}$	lb (kN)	675 (3.0)	1640 (7.3)	NA										D.6.3.2
Factored pullout resistance in 20 MPa cracked concrete[7]	$N_{pr,cr}$	lb (kN)	340 (1.5)	810 (3.6)	515 (2.3)	NA									D.6.3.2
Factored seismic pullout resistance in 20 MPa cracked concrete[7]	$N_{pr,eq}$	lb (kN)	275 (1.2)	810 (3.6)	515 (2.3)	NA									D.6.3.2

1 Design information in this table is taken from ICC-ES ESR-3027, dated February, 2016, tables 2, 3, and 4, and converted for use with CSA A23.3-14 Annex D.
2 See figure 1 of this section.
3 For concrete over metal deck applications where the concrete thickness over the top flute is less than h_{min} in this table, see figure 4 and tables 28 and 29 of this section.
4 The KWIK HUS-EZ is considered a brittle steel element as defined by CSA A23.3-14 Annex D section D.2.
5 For all design cases, $\psi_{c,N}$ = 1.0. The appropriate coefficient for breakout resistance for cracked concrete ($k_{c,cr}$) or uncracked concrete ($k_{c,uncr}$) must be used.
6 For use with the load combinations of CSA A23.3-14 chapter 8. Condition B applies where supplementary reinforcement in conformance with CSA A23.3-14 section D.5.3 is not provided, or where pullout or pryout strength governs. For cases where the presence of supplementary reinforcement can be verified, the resistance modification factors associated with Condition A may be used.
7 For all design cases, $\psi_{c,P}$ = 1.0. NA (not applicable) denotes that this value does not control for design. See section 4.1.4 of ESR-3027 for additional information.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 24 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance with concrete/pullout failure in uncracked concrete[1,2,3,4,5]

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r				Shear - V_r			
			f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)
1/4	1.18 (30)	1-5/8 (41)	665 (3.0)	710 (3.2)	750 (3.3)	820 (3.6)	805 (3.6)	900 (4.0)	985 (4.4)	1,135 (5.1)
	1.92 (49)	2-1/2 (64)	1,645 (7.3)	1,840 (8.2)	2,015 (9.0)	2,325 (10.4)	2,225 (9.9)	2,490 (11.1)	2,725 (12.1)	3,145 (14.0)
3/8	1.11 (28)	1-5/8 (41)	980 (4.4)	1,095 (4.9)	1,200 (5.3)	1,385 (6.2)	980 (4.4)	1,095 (4.9)	1,200 (5.3)	1,385 (6.2)
	1.86 (47)	2-1/2 (64)	2,120 (9.4)	2,375 (10.6)	2,600 (11.6)	3,000 (13.3)	2,120 (9.4)	2,375 (10.6)	2,600 (11.6)	3,000 (13.3)
	2.50 (64)	3-1/4 (83)	3,305 (14.7)	3,695 (16.4)	4,050 (18.0)	4,675 (20.8)	3,305 (14.7)	3,695 (16.4)	4,050 (18.0)	4,675 (20.8)
1/2	1.52 (39)	2-1/4 (57)	1,765 (7.8)	1,970 (8.8)	2,160 (9.6)	2,495 (11.1)	1,765 (7.8)	1,970 (8.8)	2,160 (9.6)	2,495 (11.1)
	2.16 (55)	3 (76)	2,990 (13.3)	3,340 (14.9)	3,660 (16.3)	4,225 (18.8)	2,990 (13.3)	3,340 (14.9)	3,660 (16.3)	4,225 (18.8)
	3.22 (82)	4-1/4 (108)	5,440 (24.2)	6,080 (27.0)	6,660 (29.6)	7,690 (34.2)	10,875 (48.4)	12,160 (54.1)	13,320 (59.3)	15,380 (68.4)
5/8	2.39 (61)	3-1/4 (83)	3,475 (15.5)	3,890 (17.3)	4,260 (18.9)	4,920 (21.9)	3,475 (15.5)	3,890 (17.3)	4,260 (18.9)	4,920 (21.9)
	3.88 (99)	5 (127)	7,195 (32.0)	8,040 (35.8)	8,810 (39.2)	10,170 (45.2)	14,385 (64.0)	16,085 (71.5)	17,620 (78.4)	20,345 (90.5)
3/4	2.92 (74)	4 (102)	4,695 (20.9)	5,250 (23.4)	5,750 (25.6)	6,640 (29.5)	9,390 (41.8)	10,500 (46.7)	11,505 (51.2)	13,280 (59.1)
	4.84 (123)	6-1/4 (159)	10,020 (44.6)	11,205 (49.8)	12,275 (54.6)	14,170 (63.0)	20,040 (89.2)	22,410 (99.7)	24,545 (109.2)	28,345 (126.1)

Table 25 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance with concrete/pullout failure in cracked concrete[1,2,3,4,5]

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r				Shear - V_r			
			f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)
1/4	1.18 (30)	1-5/8 (41)	340 (1.5)	360 (1.6)	385 (1.7)	415 (1.9)	565 (2.5)	630 (2.8)	690 (3.1)	795 (3.5)
	1.92 (49)	2-1/2 (64)	815 (3.6)	910 (4.1)	1,000 (4.4)	1,155 (5.1)	1,560 (6.9)	1,740 (7.7)	1,910 (8.5)	2,205 (9.8)
3/8	1.11 (28)	1-5/8 (41)	510 (2.3)	570 (2.5)	620 (2.8)	720 (3.2)	685 (3.0)	765 (3.4)	840 (3.7)	970 (4.3)
	1.86 (47)	2-1/2 (64)	1,485 (6.6)	1,660 (7.4)	1,820 (8.1)	2,100 (9.3)	1,485 (6.6)	1,660 (7.4)	1,820 (8.1)	2,100 (9.3)
	2.50 (64)	3-1/4 (83)	2,315 (10.3)	2,590 (11.5)	2,835 (12.6)	3,275 (14.6)	2,315 (10.3)	2,590 (11.5)	2,835 (12.6)	3,275 (14.6)
1/2	1.52 (39)	2-1/4 (57)	1,095 (4.9)	1,225 (5.5)	1,345 (6.0)	1,550 (6.9)	1,095 (4.9)	1,225 (5.5)	1,345 (6.0)	1,550 (6.9)
	2.16 (55)	3 (76)	1,860 (8.3)	2,080 (9.2)	2,275 (10.1)	2,630 (11.7)	1,860 (8.3)	2,080 (9.2)	2,275 (10.1)	2,630 (11.7)
	3.22 (82)	4-1/4 (108)	3,385 (15.1)	3,785 (16.8)	4,145 (18.4)	4,785 (21.3)	6,765 (30.1)	7,565 (33.7)	8,290 (36.9)	9,570 (42.6)
5/8	2.39 (61)	3-1/4 (83)	2,165 (9.6)	2,420 (10.8)	2,650 (11.8)	3,060 (13.6)	2,165 (9.6)	2,420 (10.8)	2,650 (11.8)	3,060 (13.6)
	3.88 (99)	5 (127)	4,475 (19.9)	5,005 (22.3)	5,480 (24.4)	6,330 (28.2)	8,950 (39.8)	10,005 (44.5)	10,965 (48.8)	12,660 (56.3)
3/4	2.92 (74)	4 (102)	2,920 (13.0)	3,265 (14.5)	3,580 (15.9)	4,130 (18.4)	5,845 (26.0)	6,535 (29.1)	7,155 (31.8)	8,265 (36.8)
	4.84 (123)	6-1/4 (159)	6,235 (27.7)	6,970 (31.0)	7,635 (34.0)	8,820 (39.2)	12,470 (55.5)	13,945 (62.0)	15,275 (67.9)	17,635 (78.4)

1 See section 3.1.8.6 to convert factored resistance value to ASD value.
2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
3 Apply spacing, edge distance, and concrete thickness factors in tables 6 to 15 as necessary. Compare to the steel values in table 22. The lesser of the values is to be used for the design.
4 Tablular values are for normal-weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: for sand-lightweight, λ_a = 0.68; for all-lightweight, λ_a = 0.60
5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-in diameter by 1-5/8-in nominal embedment depth - $\alpha_{N,seis}$ = 0.60
All other sizes - $\alpha_{N,seis}$ = 0.75
No reduction needed for seismic shear. See section 3.1.8.7 for additional information on seismic applications.

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Table 26 - Hilti KWIK HUS-EZ in the soffit of uncracked lightweight concrete over metal deck[1,2,3,4,5,6,7]

Nominal anchor diameter in.	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - N_r		Shear - V_r		Tension - N_r		Shear - V_r	
		f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)
1/4	1-5/8 (41)	585 (2.6)	660 (2.9)	665 (3.0)	665 (3.0)	720 (3.2)	810 (3.6)	665 (3.0)	665 (3.0)
	2-1/2 (64)	1,200 (5.3)	1,470 (6.5)	1,220 (5.4)	1,220 (5.4)	1,255 (5.6)	1,535 (6.8)	1,805 (8.0)	1,805 (8.0)
3/8	1-5/8 (41)	830 (3.7)	1,020 (4.5)	835 (3.7)	835 (3.7)	950 (4.2)	1,165 (5.2)	2,030 (9.0)	2,030 (9.0)
	2-1/2 (64)	1,430 (6.4)	1,755 (7.8)	835 (3.7)	835 (3.7)	1,865 (8.3)	2,285 (10.2)	3,365 (15.0)	3,365 (15.0)
	3-1/4 (83)	2,505 (11.1)	3,070 (13.7)	1,990 (8.9)	1,990 (8.9)	n/a	n/a	n/a	n/a
1/2	2-1/4 (57)	835 (3.7)	1,020 (4.5)	885 (3.9)	885 (3.9)	890 (4.0)	1,090 (4.8)	4,335 (19.3)	4,335 (19.3)
	3 (76)	1,955 (8.7)	2,395 (10.7)	1,615 (7.2)	1,615 (7.2)	n/a	n/a	n/a	n/a
	4-1/4 (108)	3,425 (15.2)	4,195 (18.7)	1,985 (8.8)	1,985 (8.8)	n/a	n/a	n/a	n/a
5/8	3-1/4 (83)	2,670 (11.9)	3,270 (14.5)	1,915 (8.5)	1,915 (8.5)	n/a	n/a	n/a	n/a
	5 (127)	6,070 (27.0)	7,430 (33.1)	2,315 (10.3)	2,315 (10.3)	n/a	n/a	n/a	n/a
3/4	4 (102)	2,670 (11.9)	3,270 (14.5)	2,075 (9.2)	2,075 (9.2)	n/a	n/a	n/a	n/a

Table 27 - Hilti KWIK HUS-EZ in the soffit of cracked lightweight concrete over metal deck[1,2,3,4,5,6,7,8]

Nominal anchor diameter in.	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - N_r		Shear - V_r		Tension - N_r		Shear - V_r	
		f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)
1/4	1-5/8 (41)	300 (1.3)	340 (1.5)	665 (3.0)	665 (3.0)	365 (1.6)	445 (2.0)	665 (3.0)	665 (3.0)
	2-1/2 (64)	595 (2.6)	730 (3.2)	1,220 (5.4)	1,220 (5.4)	625 (2.8)	765 (3.4)	1,805 (8.0)	1,805 (8.0)
3/8	1-5/8 (41)	520 (2.3)	635 (2.8)	835 (3.7)	835 (3.7)	755 (3.4)	930 (4.1)	2,030 (9.0)	2,030 (9.0)
	2-1/2 (64)	1,015 (4.5)	1,245 (5.5)	835 (3.7)	835 (3.7)	1,325 (5.9)	1,620 (7.2)	3,365 (15.0)	3,365 (15.0)
	3-1/4 (83)	1,775 (7.9)	2,175 (9.7)	1,990 (8.9)	1,990 (8.9)	n/a	n/a	n/a	n/a
1/2	2-1/4 (57)	525 (2.3)	640 (2.8)	885 (3.9)	885 (3.9)	630 (2.8)	770 (3.4)	4,335 (19.3)	4,335 (19.3)
	3 (76)	1,235 (5.5)	1,510 (6.7)	1,615 (7.2)	1,615 (7.2)	n/a	n/a	n/a	n/a
	4-1/4 (108)	2,155 (9.6)	2,640 (11.7)	1,985 (8.8)	1,985 (8.8)	n/a	n/a	n/a	n/a
5/8	3-1/4 (83)	1,680 (7.5)	2,060 (9.2)	1,915 (8.5)	1,915 (8.5)	n/a	n/a	n/a	n/a
	5 (127)	3,820 (17.0)	4,680 (20.8)	2,315 (10.3)	2,315 (10.3)	n/a	n/a	n/a	n/a
3/4	4 (102)	1,680 (7.5)	2,060 (9.2)	2,075 (9.2)	2,075 (9.2)	n/a	n/a	n/a	n/a

1 See section 3.1.8.6 to convert design strength value to ASD value.
2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is 3 x h_{nom} (nominal embedment).
4 Tabular values are lightweight concrete and no additional reduction factor is needed.
5 No additional reduction factors for spacing or edge distance need to be applied.
6 Comparison of the tabular values to the steel strength is not necessary. Tabular values control.
7 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-in diameter by 1-5/8-in nominal embedment depth - $\alpha_{N,seis}$ = 0.60
All other sizes - $\alpha_{N,seis}$ = 0.75.
See section 3.1.8.7 for additional information on seismic applications.
8 For the following anchor sizes, an additional factor for seismic shear must be applied to the cracked concrete tabular values for seismic conditions:
1/4-inch diameter - $\alpha_{v,seis}$ = 0.75
3/8-inch diameter - $\alpha_{v,seis}$ = 0.60
1/2-inch diameter - $\alpha_{v,seis}$ = 0.60
5/8-inch diameter - $\alpha_{v,seis}$ = 0.60
3/4-inch diameter - $\alpha_{v,seis}$ = 0.70

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 28 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance in the top of uncracked concrete over metal deck[1,2,3,4,5]

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r		Shear - V_r	
			f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)
1/4	1.18 (30)	1-5/8 (41)	665 (3.0)	750 (3.3)	805 (3.6)	985 (4.4)
3/8	1.11 (28)	1-5/8 (41)	980 (4.4)	1,200 (5.3)	980 (4.4)	1,200 (5.3)

Table 29 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance in the top of cracked concrete over metal deck[1,2,3,4,5]

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r		Shear - V_r	
			f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)
1/4	1.18 (30)	1-5/8 (41)	340 (1.5)	385 (1.7)	565 (2.5)	690 (3.1)
3/8	1.11 (28)	1-5/8 (41)	510 (2.3)	620 (2.8)	685 (3.0)	840 (3.7)

1 See Section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Apply spacing, edge distance, and concrete thickness factors in tables 20 and 21 as necessary. Compare to the steel values in table 22. The lesser of the values is to be used for the design.

4 Tabular values are for normal-weight concrete only. For lightweight concrete multiply design strength by λ_a as follows:
for sand-lightweight, λ_a = 0.68; for all-lightweight, λ_a = 0.60

5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-inch diameter - $\alpha_{N,seis}$ = 0.60
3/8-inch diameter- $\alpha_{N,seis}$ = 0.75.
No reduction needed for seismic shear. See section 3.1.8.7 for additional information on seismic applications.

3.3.6.3.3 Allowable Stress Design for masonry

Table 30 – Allowable tension loads for Hilti KWIK HUS-EZ installed in grout-filled masonry walls (lb)[1,2,3,4,5]

Nominal anchor diameter in.	Embedment in.[6]	Loads @ c_{cr} and s_{cr}	Spacing			Edge distance
			Critical - s_{cr} in.[7]	Minimum - s_{min} in.[7]	Load reduction factor at s_{min}[8]	Critical - c_{cr} in.[9]
1/4	1-5/8[10]	530	4	2	0.70	4
	2-1/2[11]	910		4	1.00	
3/8	1-5/8[11]	535	4	2	0.70	4
	2-1/2	895	6	4	0.80	
	3-1/4	1,210				
1/2	2-1/4	710	4	2	0.60	4
	3	1,110	8	4		
	4-1/4	1,515				
5/8	3-1/4	1,155	10	4	0.60	4
	5	1,735				
3/4	4	1,680	12	4	0.60	4
	6-1/4	2,035				

Table 31 – Allowable shear loads for Hilti KWIK HUS-EZ installed in grout-filled masonry walls (lb)[1,2,3,4,5]

Nominal anchor diameter in.	Embedment in.[6]	Load at c_{cr} and s_{cr}	Spacing			Edge distance			
			Critical - s_{cr} in.[7]	Minimum - s_{min} in.[7]	Load reduction factor at s_{min}[8]	Critical - c_{cr} in.[9]	Minimum - c_{min} in.[9]	Load reduction factor at c_{min}	
								perpendicular to edge	parallel to edge
1/4	1-5/8	675	4	4	1.00	4	4	1.00	1.00
	2-1/2	840						1.00	1.00
3/8	1-5/8	1,140	6	4	0.94	6	4	0.61	1.00
	2-1/2	1,165						0.70	1.00
	3-1/4	1,190						0.70	1.00
1/2	2-1/4	1,845	8	4	0.88	8	4	0.50	1.00
	3	2,055						0.45	0.94
	4-1/4	2,745						0.40	0.89
5/8	3-1/4	3,040	10	4	0.36	10	4	0.36	0.82
	5	3,485						0.34	0.92
3/4	4	3,040	10	4	0.36	10	4	0.36	0.82
	6-1/4	3,485						0.34	0.92

1 All values are for anchors installed in fully grouted masonry with minimum masonry prism strength of 1,500 psi. Concrete masonry units may be lightweight, medium-weight or normal-weight.

2 Anchors may not be installed within one inch in any direction of a vertical joint.

3 Linear interpolation of load values between minimum spacing s_{min} and critical spacing s_{cr} and between minimum edge distance c_{min} and critical edge distance c_{cr} is permitted.

4 For combined loading: For 1/4-in. $\frac{T_{applied}}{T_{allowable}} + \frac{V_{applied}}{V_{allowable}} \leq 1$ For 3/8- through 3/4-in. $\left(\frac{T_{applied}}{T_{allowable}}\right)^{5/3} + \left(\frac{V_{applied}}{V_{allowable}}\right)^{5/3} \leq 1$

5 See figure 5 for anchor locations.

6 Embedment depth is measured from the outside face of the concrete masonry embedment.

7 Critical spacing s_{cr} is the anchor spacing where full load values may be used. The minimum spacing s_{min} is the minimum spacing for which values are available and installation is recommended. Spacing is measured from the center of one anchor to the center of the adjacent anchor.

8 Load reduction factors are multiplicative, both spacing and edge distance load reduction factors must be considered. Load values for anchors installed at less than c_{cr} or s_{cr} must be multiplied by the appropriate load reduction factor based on actual edge distance (c) or spacing (s).

9 The critical edge distance c_{cr} is the edge distance where full load values may be used. The minimum edge distance c_{min} is the minimum edge distance for which values are available and installation is recommended. For tension, c_{cr} equals c_{min}. Edge distance is measured from the center of the anchor to the closest edge.

10 Load values must be reduced by 21% for installations within 1-1/4 inches of the bed joint.

11 Load values must be reduced by 13% for installations within 1-1/4 inches of the bed joint.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 32 – Hilti KWIK HUS-EZ allowable loads installed in top-of-grout-filled concrete masonry walls or horizontal members of wall openings[1,2,3]

Nominal anchor diameter in.	Minimum embedment depth in.	Edge distance[4] in.	Critical spacing[5] in.	Minimum end distance[6] in.	Tension lb	Shear lb	
						Load direction	
						Parallel to edge of masonry wall	Perpendicular to edge of masonry wall
1/4	1 5/8	1 1/2	4	4	205	180	135
		3 3/4			205	275	275
	2 1/2	1 1/2			355	345	155
		3 3/4			390	415	330
3/8	1 5/8	1 1/2	6	6	245	345	175
		3 3/4			245	345	345
	3 1/4	1 1/2			465	490	200
		3 3/4			540	800	625
1/2	2 1/4	1 3/4	8	8	390	460	200
		3 3/4			610	525	500
	4 1/4	1 3/4			540	885	245
		3 3/4			750	1275	550
5/8	5	1 3/4	10	10	975	930	245
		3 3/4			975	2190	630
3/4	6 1/4	3 3/4	12	12	975	2430	630

Table 33 – Hilti KWIK HUS-EZ allowable loads installed in end-of-wall or vertical members of wall openings[1,2,3]

Nominal anchor diameter in.	Minimum embedment depth in.	Edge distance[4] in.	Critical spacing[5] in.	Minimum end distance[6] in.	Tension lb	Shear lb	
						Load direction	
						Parallel to edge of masonry wall	Perpendicular to edge of masonry wall
1/4	1 5/8	1 1/2	4	4	360	525	205
		3 3/4			380	595	585
	2 1/2	1 1/2			590	610	225
		3 3/4			755	635	585
3/8	1 5/8	1 1/2	6	6	355	725	215
		3 3/4			465	1010	825
	3 1/4	1 1/2			565	875	240
		3 3/4			1020	1195	1050
1/2	2 1/4	1 3/4	8	8	500	855	260
		3 3/4			525	1100	1050
	4 1/4	1 3/4			650	925	280
		3 3/4			1150	1240	1050
5/8	5	3 3/4	10	10	1605	2215	1050
3/4	6 1/4	3 3/4	12	12	1865	2550	1050

1 All values are for anchors installed in fully grouted concrete masonry with minimum masonry prism strength of 1,500 psi. Concrete masonry units may be lightweight, medium-weight or normal-weight conforming to ASTM C90. Allowable loads are calculated using safety factor of 5.

2 See figure 6 and 7 for allowable anchor installation locations on the top of grout-filled concrete masonry walls. Anchors may not be installed within one inch of a vertical joint. See figure 7 for anchor installation locations in end-of-wall and vertical members of wall openings.

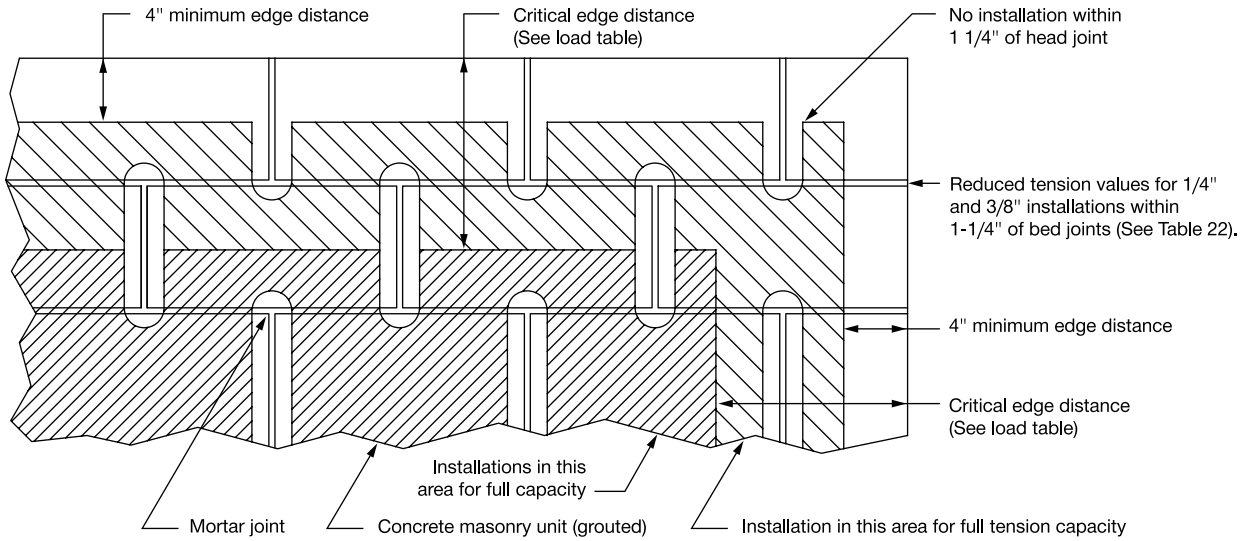
3 Anchors may not be installed within one inch in any direction of a vertical joint.

4 For load values at edge distances between listed values linear interpolation is permitted.

5 Critical spacing equals minimum spacing.

6 Minimum end distance applicable to top-of-wall and end-of-wall and does not apply for wall openings such as windows.

KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6



Anchor installation is restricted to non-shaded areas

Figure 5 – Acceptable locations (shaded areas) for Hilti KWIK HUS-EZ anchors in grout-filled concrete masonry

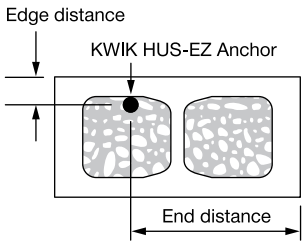


Figure 6 – Edge and end distances for the Hilti KWIK HUS-EZ anchor installed in the top of CMU masonry wall construction

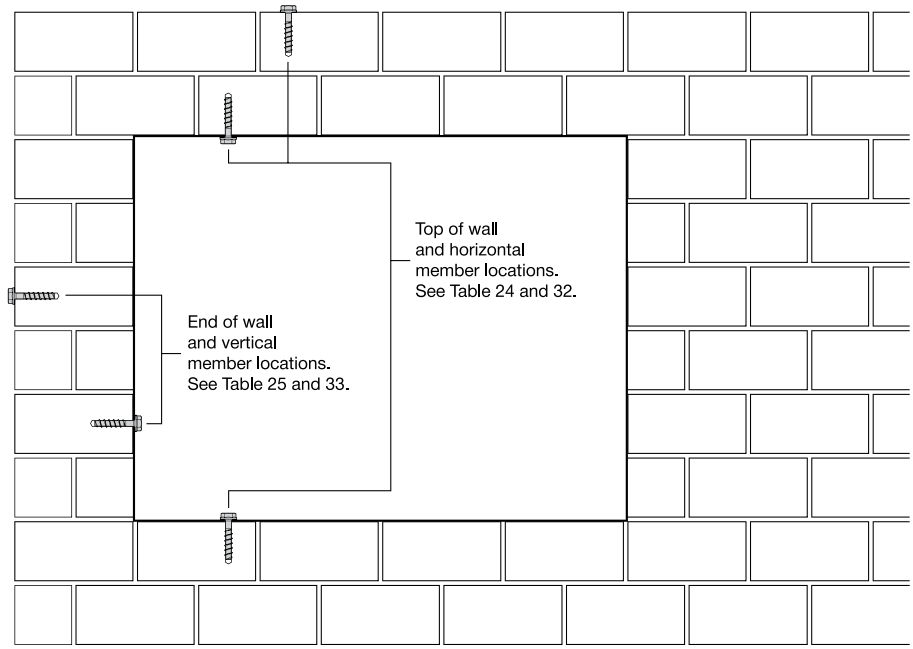


Figure 7 – Anchor locations in end of wall or wall opening applications

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

3.3.6.4 Installation instructions

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at **www.hilti.com**. Because of the possibility of changes, always verify that downloaded IFU are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the IFU.

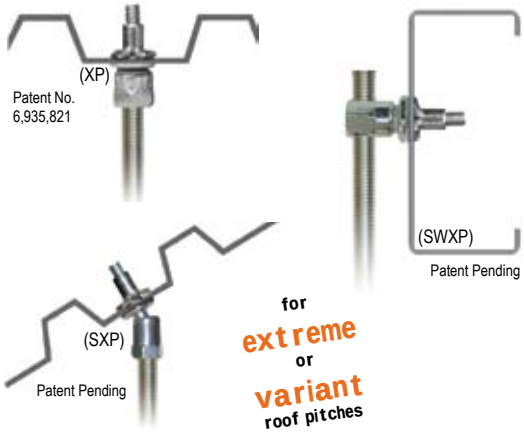
3.3.6.5 Ordering Information

Order Information

Description	Hole Diameter	Total Length without Anchor Head	Minimum Embedment Depth	Qty (pcs) / Box
KH-EZ 1/4"x1-7/8"	1/4"	1-7/8"	1-5/8"	100
KH-EZ 1/4"x2-5/8"	1/4"	2-5/8"	2-1/2"	100
KH-EZ 1/4"x3"	1/4"	3"	2-1/2"	100
KH-EZ 1/4"x3-1/2"	1/4"	3-1/2"	2-1/2"	100
KH-EZ 1/4"x4"	1/4"	4"	2-1/2"	100
KH-EZ 3/8"x1-7/8"	3/8"	1-7/8"	1-5/8"	50
KH-EZ 3/8"x2-1/8"	3/8"	2-1/8"	1-5/8"	50
KH-EZ 3/8"x3"	3/8"	3"	2-1/2"	50
KH-EZ 3/8"x3-1/2"	3/8"	3-1/2"	2-1/2"	50
KH-EZ 3/8"x4"	3/8"	4"	3-1/4"	50
KH-EZ 3/8"x5"	3/8"	5"	3-1/4"	30
KH-EZ 1/2"x2-1/2"	1/2"	2-1/2"	2-1/4"	30
KH-EZ 1/2"x3"	1/2"	3"	2-1/4"	30
KH-EZ 1/2"x3-1/2"	1/2"	3-1/2"	3"	25
KH-EZ 1/2"x4"	1/2"	4"	3"	25
KH-EZ 1/2"x4-1/2"	1/2"	4-1/2"	4 1/4"	25
KH-EZ 1/2"x5"	1/2"	5"	4 1/4"	25
KH-EZ 1/2"x6"	1/2"	6"	4-1/4"	25
KH-EZ 5/8"x3-1/2"	5/8"	3-1/2"	3-1/4"	15
KH-EZ 5/8"x4"	5/8"	4"	3-1/4"	15
KH-EZ 5/8"x5-1/2"	5/8"	5-1/2"	3-1/4"	15
KH-EZ 5/8"x6-1/2"	5/8"	6-1/2"	3-1/4"	15
KH-EZ 5/8"x8"	5/8"	8"	3-1/4"	15
KH-EZ 3/4"x4-1/2"	3/4"	4-1/2"	4"	10
KH-EZ 3/4"x5-1/2"	3/4"	5-1/2"	4"	10
KH-EZ 3/4"x7"	3/4"	7"	4"	10
KH-EZ 3/4"x8"	3/4"	8"	4"	10
KH-EZ 3/4"x9"	3/4"	9"	4"	10

STEEL STEEL STEEL STEEL

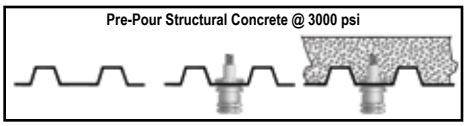
Sammy X-Press® *Installs into Metal Deck, Purlin, or Tubular Steel*

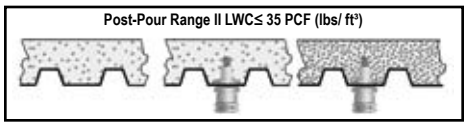


Product Features

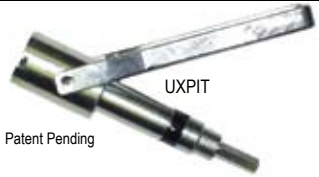
- The ***Sammy X-Press*** expands to provide direct vertical attachment in:
  - Metal Deck (22-16 gauge)
  - Z-Purlin (18-16 gauge)
- The ***Sammy X-Press Swivel*** allows you to hang plumb in extreme roof pitches:
  - 89° in Z-Purlin
  - 45° in metal deck for 12/12 pitch
- The ***Sammy X-Press Sidewinder*** expands to provide horizontal attachment in:
  - 16 ga - 3/16" steel - purlin, tubular steel.
- Installs in seconds, saving time & installation costs.
- Use in applications where access to the back of the installed fastener is prohibited. ie. metal roof deck, tubular steel, or vapor barrier fabric.
- Less jobsite material needed.
- No retaining nut required.
- Provides design flexibility.

Approvals	Rod Size	Part Number	Model	Description	Ultimate Pullout (lbs)	UL Test Load (lbs)	FM Test Load (lbs)	Min Thick	Max Thick	Box Qty	Case Qty	Application
VERTICAL MOUNT												
	1/4"	8181922	XP 200	X-Press 200	1146 (22 ga)	185 (Luminaire) 250 (Luminaire)		.027" .056"	.125"	25	125	Metal Deck
	3/8"	8150922	XP 20	X-Press 20	1146 (22 ga)	850 (2½" Pipe) 185 (Luminaire) 250 (Luminaire) 283 (Conduit & Cable)	940 (2" Pipe) 1475 (4" Pipe)	.027" .027" .056"	.125"	25	125	Metal Deck
	3/8"	8153922	XP 35	X-Press 35	1783 (16 ga)	1500 (4" Pipe) 85 (Luminaire) 250 (Luminaire) 416 (Conduit & Cable)	940 (2" Pipe) 1475 (4" Pipe)	.060" .105" .027" .056"	.125"	25	125	Purlin
	3/8"	8294922	SXP 20	Swivel X-Press 20	1061 (22 ga Vertical) 829 (45° Off Vertical)	750 (2" Pipe) 170 vertical (Luminaire) 80 @ 45° (Luminaire) 283 vertical (Conduit & Cable) 233 @ 45° (Conduit & Cable)	635 (2" Pipe)	.027"	.125"	25	125	Metal Deck
	3/8"	8295922	SXP 35	Swivel X-Press 35	1675 (16 ga Vertical) 1558 (89° Off Vertical)	1500 (4" Pipe) 250 vertical (Luminaire) 80 @ 90° (Luminaire) 500 vertical (Conduit & Cable) 333 @ 89° (Conduit & Cable)	635 (2" Pipe)	.060"	.125"	25	125	Purlin
	3/8"	8150922	XP 20	Sammy X-Press 20	1146 (22 ga)	850 (2½ Pipe)	Pre-Pour Structural Concrete@ 3000 psi Post-Pour Range II LWC≤ 35 PCF (lbs/ft³)			25	125	Metal Deck (Pre-Pour) Metal Deck (Post-Pour)
HORIZONTAL MOUNT												
	3/8"	8293957	SWXP 35	Sidewinder X-Press 35	1798 (16 ga)	1250 (3¼" Pipe) 80 (Luminaire) 416 (Conduit & Cable)		.060"	.125"	25	125	Purlin





Sammy X-Press It® INSTALLATION TOOL



Part Number	Model	Description	Each Qty
8194910	UXPIT*	Universal X-Press It Tool	1
8195910	RXPIT	Retro Socket for 8151910	1
8152910	XPDB	25/64" Drill Bit	1

*Tool Includes: Sleeve, Bit Receiver, Hex Wrench, and 25/64" Drill Bit.

To watch a video demonstration of the Sammy X-Press, visit http://www.sammysuperscrew.com/sammyxpress.htm

MADE IN U.S.A

RoHS Compliant

Fig. 146 — Continuous Threaded Rod

Size Range: 1/4" through 1½" Stocked in six, ten, and twelve foot lengths. Other even foot lengths can be furnished to order.

Material: Carbon steel; rod threaded complete length.

Finish: ❑ Plain or ❑ Galvanized.

Maximum Temperature: 650° F.

Ordering: Specify rod diameter and length, figure number, name and finish.

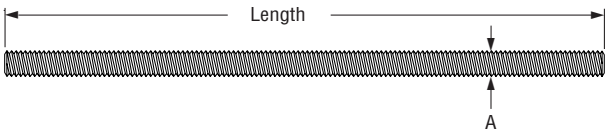


Fig. 146: Loads (lbs) • Weights (lbs) Dimensions (in)

Rod Size A	Threads per Inch	Max Load 650° F	Weight per Ft.
1/4	20	240	0.12
3/8	16	730	0.30
1/2	13	1,350	0.53
5/8	11	2,160	0.84
3/4	10	3,230	1.20
7/8	9	4,480	1.70
1	8	5,900	2.30
1 1/4	7	9,500	3.60
1 1/2	6	13,800	5.10

Note: Other rod sizes available upon request.
Class 2 fit is available upon request.

Pipe Hanger Submittal Sheet

Project:	**Architect / Engineer:**	**Approval Stamp:**
Date:	**Phone:**	
Contractor:		
Address:		
Notes 1:		
Notes 2:		

Fig. 92 — Universal C-type Clamp (Standard Throat)

Size Range: 3/8 and 1/2"

Material: Ductile iron, hardened steel cup point set screw and locknut.

Finish: ❑ Plain or ❑ Galvanized

Service: Recommended for use under roof installations with bar joist type construction, or for attachment to the top or bottom flange of structural shapes where the vertical hanger rod is required to be offset from the edge of the flange and where the thickness of joist or flange does not exceed 3/4".

Approvals: Complies with Federal Specification A-A-1192A (Type 19 & 23) *WW-H-171-E (Type 23)* and MSS-SP-69 (Type 19 & 23).
UL, ULC Listed and FM Approved.

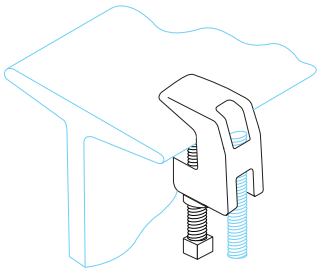
How to size: Size of clamp is determined by size of rod to be used.

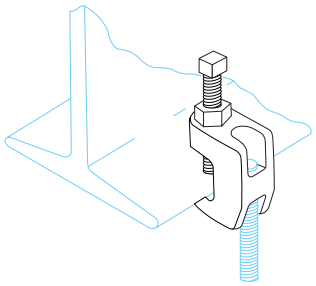
Installation: Follow recommended set screw torque values per MSS-SP-69
(See table on page PH-212)

Features:

- They may be attached to horizontal flanges of structural members in either the top beam or bottom beam positions.
- Secured in place by a cup-pointed Set Screw tightened against the flange. A Jam Nut is provided for tightening the Set Screw against the Body Casting.
- Thru tapping of the body casting permits extended adjustment of the threaded rod.
- Can be used with Fig 89X retaining clip for seismic applications.

Ordering: Specify rod size, figure number, name of clamp and finish.





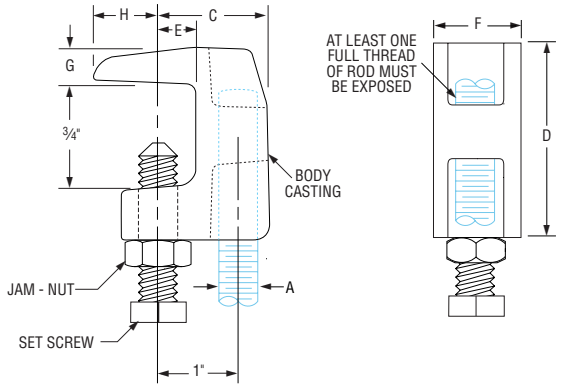


Fig. 92: Load (lbs) • Weight (lbs) • Dimensions (in)

Rod Size A	Set Screw Size	Max Loads ■		Weight	C	D	E	F	G	H
		Top	Bottom							
3/8	3/8	500	250	0.34	1 5/16	1 9/16	9/16	1 3/16	3/8	1/2
1/2	1/2	950	760	0.63	1 3/8	1 13/16	1/2	1 1/16	7/16	23/32

■ Maximum temperature of 450° F

Pipe Hanger Submittal Sheet

Project:	**Architect / Engineer:**	**Approval Stamp:**
Date:	**Phone:**	
Contractor:		
Address:		
Notes 1:		
Notes 2:		

Fig. 69 — Adjustable Swivel Ring, Tapped Per NFPA Standards

Size Range: 1/2" through 8"
Material: Carbon steel
Finish: ❑ Galvanized
Service: Recommended for suspension of non-insulated **stationary** pipe line.
Maximum Temperature: 650° F
Approvals: Complies with Federal Specification A-A-1192A (Type 10) *WW-H-171-E (Type 10)* and MSS-SP-69 (Type 10).
UL Listed and FM Approved (Sizes 3/4" - 8").

Features:

- Threads are countersunk so that they cannot become burred or damaged.
- Knurled swivel nut provides vertical adjustment after piping is in place.
- Captured swivel nut in the 1/2" through 3" sizes.

Ordering: Specify size, figure number and name.

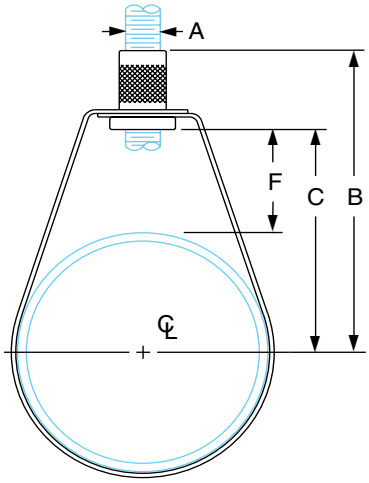


Fig. 69: Loads (lbs) • Weight (lbs) • Dimensions (in)

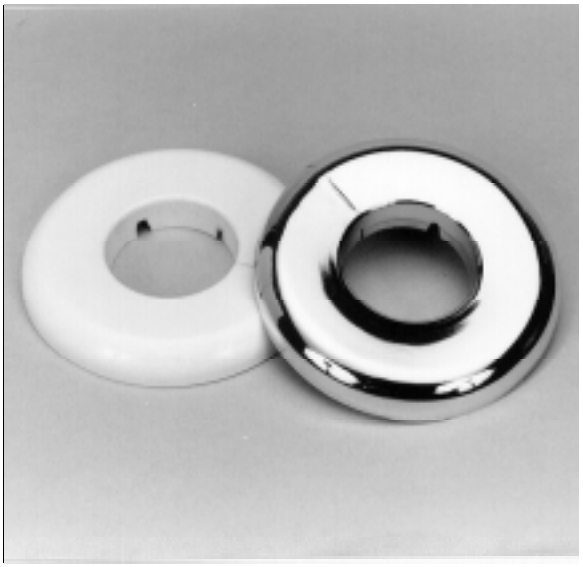
Pipe Size	Max Load	Weight	Rod Size A	B	C	F
1/2	300	0.10	3/8	2 7/8	2	1 9/16
3/4		0.10		2 3/4	1 7/8	1 15/16
1		0.10		2 9/16	1 11/16	1
1 1/4		0.10		2 5/8	1 3/4	7/8
1 1/2		0.10		2 3/4	1 7/8	
2		0.11		3 1/4	2 3/8	1 1/8
2 1/2	525	0.20		4	2 3/4	1 5/16
3		0.20		3 13/16	2 15/16	1 3/16
4	650	0.30		4 11/16	3 13/16	1 9/16
5	1,000	0.54	1/2	5 5/16	4 3/8	
6		0.65		6 11/16	5 9/16	2 1/4
8		1.00		8	7	2 11/16

Pipe Hanger Submittal Sheet

Project:	**Architect / Engineer:**	**Approval Stamp:**
Date:	**Phone:**	
Contractor:		
Address:		
Notes 1:		
Notes 2:		

Section 6 – Specialties

Plastic Wall Plates (Floor/Ceiling)



Description

FPPI Plastic Floor and Ceiling Plates are manufactured from light weight injection molded plastic and are of single piece construction and rustproof. They are suitable for both interior and exterior uses and are highly recommended in corrosive environments. Available in IP sizes 1/2" through 8". Made in the USA.

Installation

The plastic wall plates may be installed by two methods. The first is by placing the wall plate over the pipe while the pipe is being installed. The second is by splitting the wall plate at the area on the back of the wall plates that has been molded to break apart. Carefully bend the wall plate a this weakened area until fully separated. Then carefully twist the wall plate open just enough to be placed around the pipe. Allow the two ends of the separated wall plate to "spring" back into shape. Slide the wall plate up against the base material to finish the installation. The wall plates should not be painted. Certain chemicals contained in paint may cause the wall plates to deteriorate.

Specs

size(IP)*	ID	OD
1/2"	.827	2.787
3/4"	1.037	2.997
1"	1.298	3.210
1 1/4"	1.640	3.580
1 1/2"	1.900	3.900
2"	2.380	4.450
2 1/2"	2.900	5.280
3"	3.535	5.925
4"	4.575	6.935
5"	5.655	9.655
6"	6.740	9.820
8"	8.790	13.010

Depth:
3/16"

Finish:
Chrome
White
Brass (special order)

*Some copper sizes also available.

For questions:
1 800 344-1822
1 800 344-3775 fax
http://www.fppi.com

Spare Sprinkler Head Storage Cabinet

Description

Fire Protection Products, Inc. Spare Sprinkler Head Cabinets are designed to allow for spare sprinkler head storage as required by NFPA guidelines. The Spare Sprinkler Head Cabinets are available in six configurations. Three head, six head, six head ESFR, twelve head, twenty-four head and thirty-six head. All six styles are manufactured with "knockouts" to accommodate the most common size sprinklers. The shelf is located to allow for the storage of a typical sprinkler head wrench. Each cabinet is finished with a red enamel fi nish. Each spare head cabinet comes with a hinged door which remains closed to protect the spare sprinklers from the elements and features two holes on the back panel to allow for attachment to most surfaces utilizing the appropriate fasteners. Not intended for exposed or harsh environments.

Specifications

Material:
Painted plain steel

Finish:
Red enamel

Styles:
3 Spare sprinklers, 1/2 or 3/4

6 Spare sprinklers, 1/2 or 3/4

6 Spare, ESFR, 1/2 , 3/4 or 1"

12 Spare sprinklers 1/2 or 3/4

24 Spare sprinklers

36 Spare sprinklers

Installation

Select the correct Spare Sprinkler Head Cabinet in accordance with the Automatic Sprinkler Systems Handbook. As per the 1989 Edition the correct number of spare sprinkler is as follows:

“0-300 sprinklers, not less than 6
300-1000, not less than 12
1000 or more, not less than 24.
Stock of spare sprinklers shall include all types and ratings installed.”*

Once the correct Spare Sprinkler Head Cabinet has been select-ed, installation is accomplished by inserting the correct fastener in each of the two holes inside the cabinet, securing the cabinet securely to the wall. The insert the correct number and type of sprinklers in accordance with the “handbook”.

*Final determination is subject to approval by the AHJ.

Fire Protection Products, Inc
6241 Yarrow Dr., Suite A, Carlsbad, CA 92011-1541
For questions: 1 800 344-1822 • 1 800 344-3775 fax • www.fppi.com

Section 7 – Hydraulic Calculations

SUBMITTED SEPERATELY WITH SHOP DRAWINGS

Hydraulic Calculations by HydraCALC

ALLIED FIRE PROTECTION
80 RUPERT RD
RALEIGH, NC 27603
919-772-9200

Job Name	:	HARNETT COUNTY GSC
Drawing	:	FP-6
Location	:	LILLINGTON
Remote Area	:	1
Contract	:	
Data File	:	RA#1 HARNETT GSC CLERESTORY.WXF

HYDRAULIC CALCULATIONS
for

Project name: HARNETT COUNTY GSC
Location: LILLINGTON
Drawing no: FP-6
Date: 10-14-19

Design

Remote area number: 1
Remote area location: CLERESTORY
Occupancy classification: LIGHT HAZARD
Density: .10 - Gpm/SqFt
Area of application: 1859 - SqFt
Coverage per sprinkler: 168 - SqFt
Type of sprinklers calculated: RECESSED PENDENTS
No. of sprinklers calculated: 15
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 363.723 - GPM @ 58.833 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

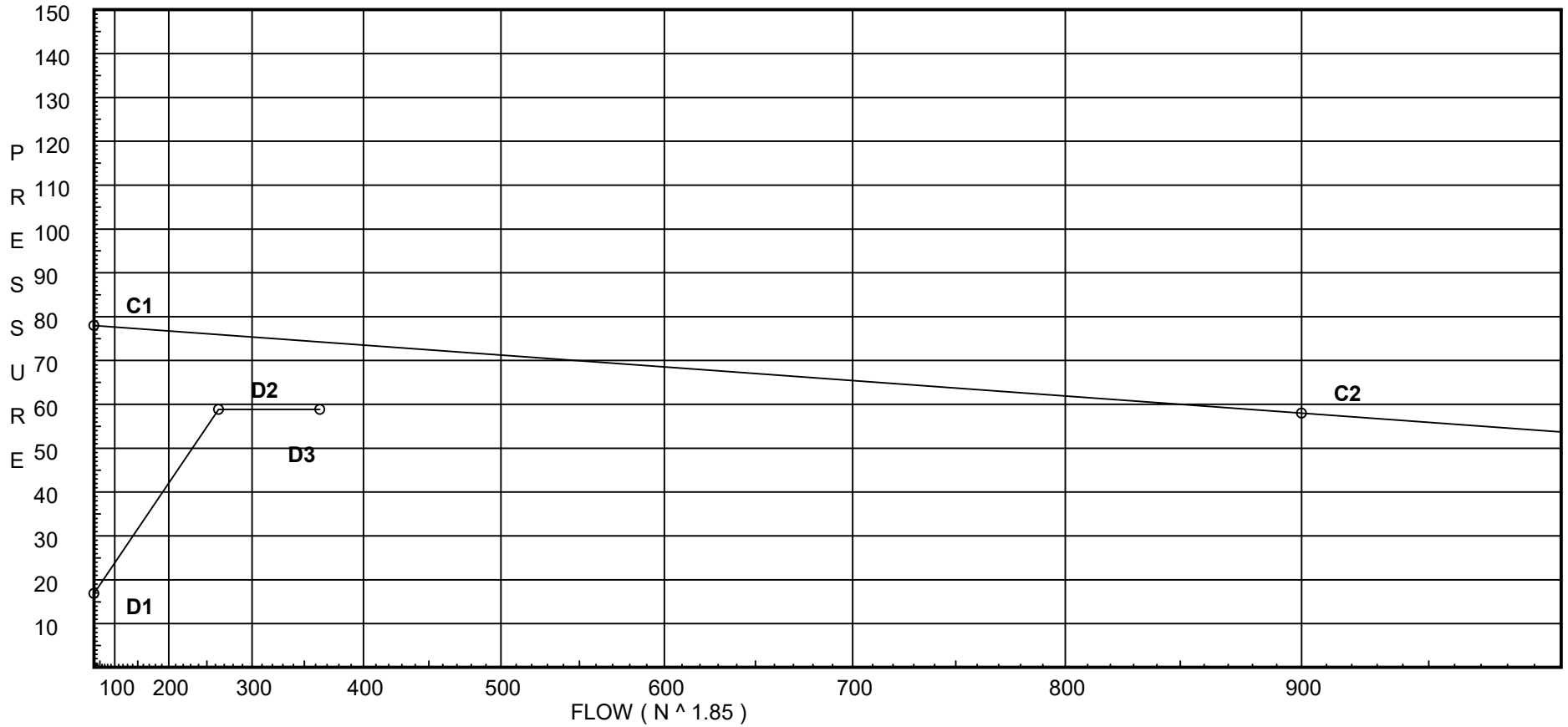
Date: 8/7/19
Location: *SEE HYDRANT TEST REPORT
Source:

Name of contractor: ALLIED FIRE PROTECTION
Address: 80 RUPERT RD / / RALEIGH, NC 27603
Phone number: 919-772-9200
Name of designer: MICHAEL GODSEY
Authority having jurisdiction: HARNETT COUNTY FIRE MARSHAL
Notes: (Include peaking information or gridded systems here.)
**A SAFETY FACTOR OF 15.42 PSI REMAINS

**THE RISER VALVE (A GLOBE UMC UNIVERSAL RISER) INCLUDES AN INTEGRATED FLOW SWITCH AND BUTTERFLY VALVE. INDICATED ON CALC WORKSHEET IS "EQL" WHICH IS A SET EQUIVELANT PIPE LENGTH OF 18.5' FOR THE UMC VALVE ACCORDING THE MANUFACTURER CUT SHEET. THE VALUE IS AUTOMATICALLY ADJUSTED BY HYDRACALC TO ACCOUNT FOR SCH10 PIPING, AS NOTED ON CALC WORKSHEET
**FLEX HEADS ALSO HAVE AN EQUIV LENGTH OF 70' INCLUDED (SEE FP-2)

City Water Supply:
- C1 - Static Pressure : 78
- C2 - Residual Pressure: 58
- C2 - Residual Flow : 900

Demand:
- D1 - Elevation : 16.891
- D2 - System Flow : 263.723
- D2 - System Pressure : 58.833
- Hose (Demand) : 100
- D3 - System Demand : 363.723
- Safety Margin : 15.424



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
H	45' Grvd-Vic Elbow #11	0	0	1	1.5	2	2	3	3	3.5	3.5	4.5	5	6.5	8.5	10	18	20	23	25	30
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
J	90'Tee-Branch Grv Vic #20	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120
Zim	Wilkins 375ADA	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

HYDRACALC AUTOMATICALLY ADJUSTS EQUIV PIPE LENGTH INDICATED AS "EQL" IN CALCULATIONS AND ENTERED AS A VALUE FOR THE INTEGRATED UMC RISER VALVE, TO ACCOUNT FOR SCH 10 PIPING

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
H1	39.0	5.6	9.04	na	16.84	0.1	168	7.0
H2	39.0	5.6	9.14	na	16.93	0.1	168	7.0
H3	39.0	5.6	9.49	na	17.25	0.1	168	7.0
H4	39.0	5.6	10.26	na	17.94	0.1	168	7.0
H5	39.0	5.6	11.6	na	19.07	0.1	168	7.0
H6	39.0	5.6	9.01	na	16.81	0.1	168	7.0
H7	39.0	5.6	9.11	na	16.9	0.1	168	7.0
H8	39.0	5.6	9.46	na	17.22	0.1	168	7.0
H9	39.0	5.6	10.22	na	17.9	0.1	168	7.0
H10	39.0	5.6	11.56	na	19.04	0.1	168	7.0
H11	39.0	5.6	9.0	na	16.8	0.1	168	7.0
H12	39.0	5.6	9.1	na	16.89	0.1	168	7.0
H13	39.0	5.6	9.45	na	17.22	0.1	168	7.0
H14	39.0	5.6	10.21	na	17.9	0.1	168	7.0
H15	39.0	5.6	11.55	na	19.03	0.1	168	7.0
N1	39.667		15.38	na				
N2	39.667		15.54	na				
N3	39.667		16.14	na				
N4	39.667		17.41	na				
N5	39.667		19.65	na				
N6	39.667		15.32	na				
N7	39.667		15.49	na				
N8	39.667		16.08	na				
N9	39.667		17.35	na				
N10	39.667		19.58	na				
N11	39.667		15.31	na				
N12	39.667		15.47	na				
N13	39.667		16.07	na				
N14	39.667		17.34	na				
N15	39.667		19.56	na				
M1	39.667		25.25	na				
M2	39.667		25.27	na				
M3	39.667		25.36	na				
M4	39.667		25.59	na				
M5	29.333		30.39	na				
M6	29.333		31.1	na				
M7	29.333		32.58	na				
TOR2	28.333		33.63	na				
BOR2	1.75		46.35	na				
UG1	1.75		57.22	na				
UG2	-3.0		59.32	na				
UG3	-3.0		59.52	na				
UG4	-3.0		59.93	na				
UG5	-3.0		60.04	na				
TEST	0.0		58.83	na	100.0			

The maximum velocity is 13.87 and it occurs in the pipe between nodes N5 and M3

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqiv	Len	Pipe Ftngs Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
H1	16.84	1.049		0.0	70.000	9.039		K Factor = 5.60
to		120.0		0.0	0.0	-0.289		
N1	16.84	0.0946		0.0	70.000	6.625		Vel = 6.25
	0.0							
	16.84					15.375		K Factor = 4.29
H2	16.93	1.049		0.0	70.000	9.137		K Factor = 5.60
to		120.0		0.0	0.0	-0.289		
N2	16.93	0.0956		0.0	70.000	6.692		Vel = 6.28
	0.0							
	16.93					15.540		K Factor = 4.29
H3	17.25	1.049		0.0	70.000	9.493		K Factor = 5.60
to		120.0		0.0	0.0	-0.289		
N3	17.25	0.0990		0.0	70.000	6.931		Vel = 6.40
	0.0							
	17.25					16.135		K Factor = 4.29
H4	17.93	1.049		0.0	70.000	10.257		K Factor = 5.60
to		120.0		0.0	0.0	-0.289		
N4	17.93	0.1064		0.0	70.000	7.446		Vel = 6.66
	0.0							
	17.93					17.414		K Factor = 4.30
H5	19.07	1.049		0.0	70.000	11.596		K Factor = 5.60
to		120.0		0.0	0.0	-0.289		
N5	19.07	0.1191		0.0	70.000	8.340		Vel = 7.08
	0.0							
	19.07					19.647		K Factor = 4.30
H6	16.81	1.049		0.0	70.000	9.008		K Factor = 5.60
to		120.0		0.0	0.0	-0.289		
N6	16.81	0.0943		0.0	70.000	6.603		Vel = 6.24
	0.0							
	16.81					15.322		K Factor = 4.29
H7	16.90	1.049		0.0	70.000	9.105		K Factor = 5.60
to		120.0		0.0	0.0	-0.289		
N7	16.9	0.0953		0.0	70.000	6.670		Vel = 6.27
	0.0							
	16.90					15.486		K Factor = 4.29
H8	17.22	1.049		0.0	70.000	9.460		K Factor = 5.60
to		120.0		0.0	0.0	-0.289		
N8	17.22	0.0987		0.0	70.000	6.909		Vel = 6.39
	0.0							
	17.22					16.080		K Factor = 4.29
H9	17.90	1.049		0.0	70.000	10.222		K Factor = 5.60
to		120.0		0.0	0.0	-0.289		
N9	17.9	0.1060		0.0	70.000	7.422		Vel = 6.64
	0.0							
	17.90					17.355		K Factor = 4.30
H10	19.04	1.049		0.0	70.000	11.555		K Factor = 5.60
to		120.0		0.0	0.0	-0.289		
N10	19.04	0.1188		0.0	70.000	8.314		Vel = 7.07

Final Calculations : Hazen-Williams

ALLIED FIRE PROTECTION
HARNETT COUNTY GSC

Hyd. Ref. Point	Qa / Qt	Dia. "C" Pf/Ft	Fitting or Eqiv	Len	Pipe Ftngs Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
	0.0 19.04					19.580		K Factor = 4.30
H11 to N11	16.80 16.8	1.049 120.0 0.0943		0.0 0.0 0.0	70.000 0.0 70.000	9.000 -0.289 6.598		K Factor = 5.60 Vel = 6.24
	0.0 16.80					15.309		K Factor = 4.29
H12 to N12	16.89 16.89	1.049 120.0 0.0952		0.0 0.0 0.0	70.000 0.0 70.000	9.098 -0.289 6.664		K Factor = 5.60 Vel = 6.27
	0.0 16.89					15.473		K Factor = 4.29
H13 to N13	17.22 17.22	1.049 120.0 0.0986		0.0 0.0 0.0	70.000 0.0 70.000	9.452 -0.289 6.903		K Factor = 5.60 Vel = 6.39
	0.0 17.22					16.066		K Factor = 4.30
H14 to N14	17.90 17.9	1.049 120.0 0.1059		0.0 0.0 0.0	70.000 0.0 70.000	10.213 -0.289 7.416		K Factor = 5.60 Vel = 6.64
	0.0 17.90					17.340		K Factor = 4.30
H15 to N15	19.03 19.03	1.049 120.0 0.1187		0.0 0.0 0.0	70.000 0.0 70.000	11.546 -0.289 8.307		K Factor = 5.60 Vel = 7.06
	0.0 19.03					19.564		K Factor = 4.30
N1 to N2	16.84 16.84	1.61 120.0 0.0118		0.0 0.0 0.0	14.000 0.0 14.000	15.375 0.0 0.165		 Vel = 2.65
N2 to N3	16.92 33.76	1.61 120.0 0.0425		0.0 0.0 0.0	14.000 0.0 14.000	15.540 0.0 0.595		 Vel = 5.32
N3 to N4	17.26 51.02	1.61 120.0 0.0914		0.0 0.0 0.0	14.000 0.0 14.000	16.135 0.0 1.279		 Vel = 8.04
N4 to N5	17.93 68.95	1.61 120.0 0.1595		0.0 0.0 0.0	14.000 0.0 14.000	17.414 0.0 2.233		 Vel = 10.87
N5 to M3	19.07 88.02	1.61 120.0 0.2506	J	8.0 0.0 0.0	14.792 8.000 22.792	19.647 0.0 5.711		 Vel = 13.87
	0.0 88.02					25.358		K Factor = 17.48
N6 to N7	16.81 16.81	1.61 120.0 0.0117		0.0 0.0 0.0	14.000 0.0 14.000	15.322 0.0 0.164		 Vel = 2.65

Hyd. Ref. Point	Qa / Qt	Dia. "C" / Pf/Ft	Fitting or Eqiv	Len	Pipe Ftngs Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
N7	16.90	1.61		0.0	14.000	15.486		
to		120.0		0.0	0.0	0.0		
N8	33.71	0.0424		0.0	14.000	0.594		Vel = 5.31
N8	17.22	1.61		0.0	14.000	16.080		
to		120.0		0.0	0.0	0.0		
N9	50.93	0.0911		0.0	14.000	1.275		Vel = 8.03
N9	17.90	1.61		0.0	14.000	17.355		
to		120.0		0.0	0.0	0.0		
N10	68.83	0.1589		0.0	14.000	2.225		Vel = 10.85
N10	19.04	1.61	J	8.0	14.792	19.580		
to		120.0		0.0	8.000	0.0		
M2	87.87	0.2498		0.0	22.792	5.693		Vel = 13.85
	0.0							
	87.87					25.273		K Factor = 17.48
N11	16.80	1.61		0.0	14.000	15.309		
to		120.0		0.0	0.0	0.0		
N12	16.8	0.0117		0.0	14.000	0.164		Vel = 2.65
N12	16.89	1.61		0.0	14.000	15.473		
to		120.0		0.0	0.0	0.0		
N13	33.69	0.0424		0.0	14.000	0.593		Vel = 5.31
N13	17.22	1.61		0.0	14.000	16.066		
to		120.0		0.0	0.0	0.0		
N14	50.91	0.0910		0.0	14.000	1.274		Vel = 8.02
N14	17.89	1.61		0.0	14.000	17.340		
to		120.0		0.0	0.0	0.0		
N15	68.8	0.1589		0.0	14.000	2.224		Vel = 10.84
N15	19.03	1.61	J	8.0	14.792	19.564		
to		120.0		0.0	8.000	0.0		
M1	87.83	0.2496		0.0	22.792	5.688		Vel = 13.84
	0.0							
	87.83					25.252		K Factor = 17.48
M1	87.83	4.26		0.0	9.583	25.252		
to		120.0		0.0	0.0	0.0		
M2	87.83	0.0022		0.0	9.583	0.021		Vel = 1.98
M2	87.87	4.26		0.0	10.833	25.273		
to		120.0		0.0	0.0	0.0		
M3	175.7	0.0078		0.0	10.833	0.085		Vel = 3.95
M3	88.02	4.26	I	9.217	4.667	25.358		
to		120.0		0.0	9.217	0.0		
M4	263.72	0.0167		0.0	13.884	0.232		Vel = 5.94
M4	0.0	4.26	I	9.217	10.333	25.590		
to		120.0		0.0	9.217	4.476		
M5	263.72	0.0167		0.0	19.550	0.326		Vel = 5.94
M5	0.0	4.26	I	9.217	12.125	30.392		
to		120.0	J	21.067	30.284	0.0		
M6	263.72	0.0167		0.0	42.409	0.708		Vel = 5.94
M6	0.0	4.26	2I	18.434	48.917	31.100		
to		120.0	J	21.067	39.501	0.0		
M7	263.72	0.0167		0.0	88.418	1.476		Vel = 5.94

Final Calculations : Hazen-Williams

ALLIED FIRE PROTECTION
HARNETT COUNTY GSC

Date 10-14-19

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqiv	Len	Pipe Ftngs Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
M7	0.0	4.26	I	9.217	28.167	32.576		
to		120.0		0.0	9.217	0.433		
TOR2	263.72	0.0167		0.0	37.384	0.624		Vel = 5.94
TOR2	0.0	4.26	J	21.067	26.500	33.633		
to		120.0	Eql	24.359	45.426	11.513		
BOR2	263.72	0.0167		0.0	71.926	1.201		Vel = 5.94
BOR2	0.0	6.357	Zim	0.0	7.583	46.347		
to		120.0	I	12.573	12.573	10.826		* * Fixed Loss = 10.826
UG1	263.72	0.0024		0.0	20.156	0.048		Vel = 2.67
UG1	0.0	6.16	I	14.346	4.750	57.221		
to		140.0		0.0	14.346	2.057		
UG2	263.72	0.0021		0.0	19.096	0.040		Vel = 2.84
UG2	0.0	6.16	G	4.304	54.917	59.318		
to		140.0	J	35.864	40.168	0.0		
UG3	263.72	0.0021		0.0	95.085	0.198		Vel = 2.84
UG3	0.0	6.16	2H	14.346	150.333	59.516		
to		140.0	J	35.864	50.210	0.0		
UG4	263.72	0.0021		0.0	200.543	0.418		Vel = 2.84
UG4	0.0	6.16	J	35.864	16.000	59.934		
to		140.0		0.0	35.864	0.0		
UG5	263.72	0.0021		0.0	51.864	0.108		Vel = 2.84
UG5	0.0	6.16	G	4.304	3.500	60.042		
to		140.0	J	35.864	40.168	-1.299		
TEST	263.72	0.0021		0.0	43.668	0.090		Vel = 2.84
	100.00							Qa = 100.00
	363.72					58.833		K Factor = 47.42

EQL= EQUIVELANT PIPE LENGTH FOR UMC UNIVERSAL RISER, WHICH INCLUDES THE FLOW SWITCH AND BUTTERFLY VALVE. SEE MANUF CUT SHEET.

Hydraulic Calculations by HydraCALC

ALLIED FIRE PROTECTION
80 RUPERT RD
RALEIGH, NC 27603
919-772-9200

Job Name	:	HARNETT COUNTY GSC
Drawing	:	FP-6
Location	:	LILLINGTON
Remote Area	:	1
Contract	:	
Data File	:	RA#2 HARNETT GSC OH1.WXF

HYDRAULIC CALCULATIONS
for

Project name: HARNETT COUNTY GSC
Location: LILLINGTON
Drawing no: FP-6
Date: 10-14-19

Design

Remote area number: 1
Remote area location: SOUTHEAST CORNER OF LEVEL 2
Occupancy classification: OH1 HAZARD
Density: .15 - Gpm/SqFt
Area of application: 1050 - SqFt
Coverage per sprinkler: 130 - SqFt
Type of sprinklers calculated: UPRIGHTS
No. of sprinklers calculated: 11
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 494.760 - GPM @ 51.871 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

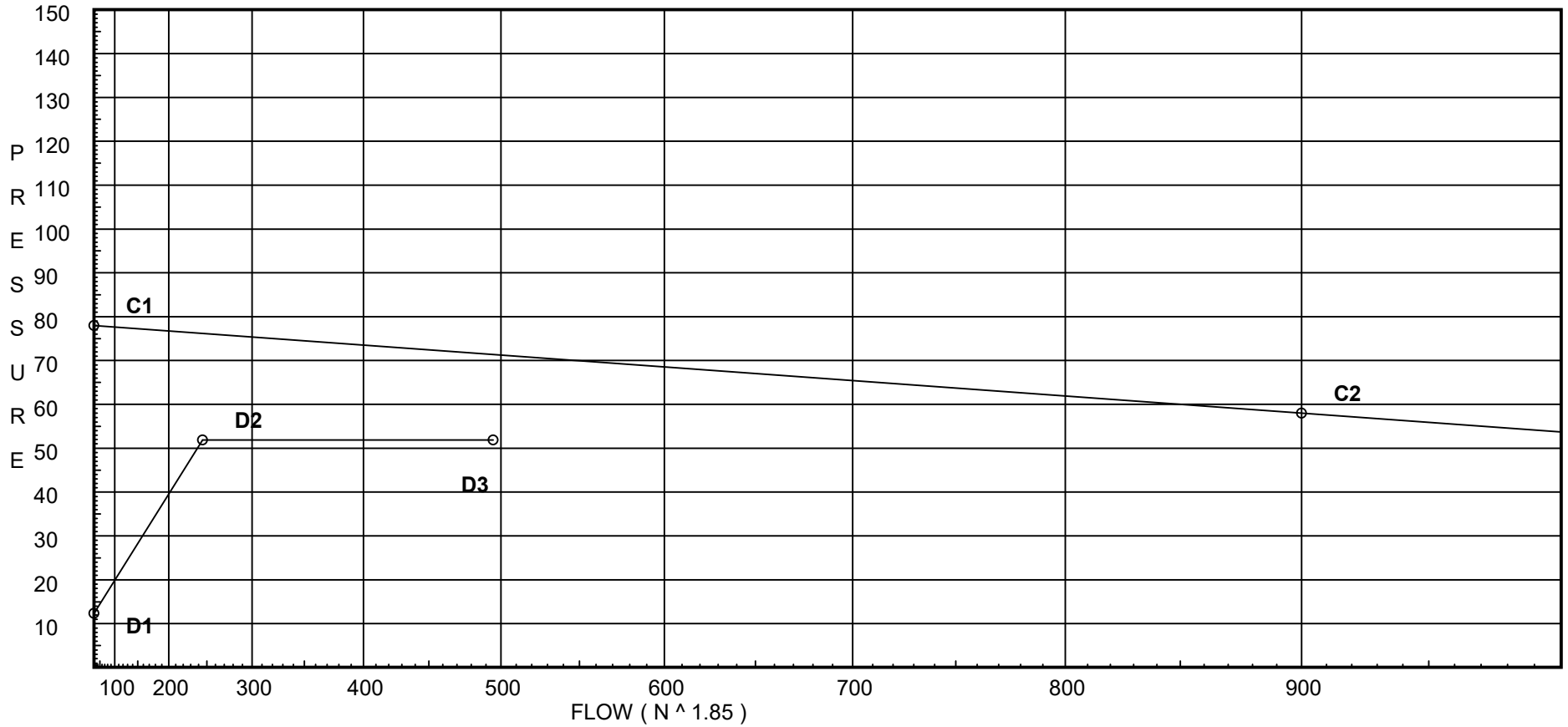
Date: 8/7/19
Location: *SEE HYDRANT TEST REPORT
Source:

Name of contractor: ALLIED FIRE PROTECTION
Address: 80 RUPERT RD / / RALEIGH, NC 27603
Phone number: 919-772-9200
Name of designer: MICHAEL GODSEY
Authority having jurisdiction: HARNETT COUNTY FIRE MARSHAL
Notes: (Include peaking information or gridded systems here.)
**A SAFETY FACTOR OF 19.52 PSI REMAINS

**THE RISER VALVE (A GLOBE UMC UNIVERSAL RISER) INCLUDES AN INTEGRATED FLOW SWITCH AND BUTTERFLY VALVE. INDICATED ON CALC WORKSHEET IS "EQL" WHICH IS A SET EQUIVELANT PIPE LENGTH OF 18.5' FOR THE UMC VALVE ACCORDING THE MANUFACTURER CUT SHEET. THE VALUE IS AUTOMATICALLY ADJUSTED BY HYDRACALC TO ACCOUNT FOR SCH10 PIPING, AS NOTED ON CALC WORKSHEET
**FLEX HEADS ALSO HAVE AN EQUIV LENGTH OF 70' INCLUDED (SEE FP-2)

City Water Supply:
- C1 - Static Pressure : 78
- C2 - Residual Pressure: 58
- C2 - Residual Flow : 900

Demand:
- D1 - Elevation : 12.343
- D2 - System Flow : 244.76
- D2 - System Pressure : 51.871
- Hose (Demand) : 250
- D3 - System Demand : 494.76
- Safety Margin : 19.517



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
H	45' Grvd-Vic Elbow #11	0	0	1	1.5	2	2	3	3	3.5	3.5	4.5	5	6.5	8.5	10	18	20	23	25	30
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
J	90'Tee-Branch Grv Vic #20	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120
Zim	Wilkins 375ADA	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

HYDRACALC AUTOMATICALLY ADJUSTS EQL PIPE LENGTHS TO ACCOUNT FOR SCH10 PIPING OF THE RISER. SEE BELOW AND MANUF CUT SHEET FOR DETAILS

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
H20	29.333	5.6	16.23	na	22.56	0.15	130	7.0
H21	29.333	5.6	16.43	na	22.7	0.15	130	7.0
H22	29.333	5.6	17.16	na	23.2	0.15	130	7.0
H23	29.333	5.6	16.24	na	22.57	0.15	130	7.0
H24	29.333	5.6	16.44	na	22.71	0.15	130	7.0
H25	29.333	5.6	17.18	na	23.21	0.15	130	7.0
H27	29.333	5.6	16.28	na	22.6	0.15	130	7.0
H28	29.333	5.6	16.49	na	22.74	0.15	130	7.0
H29	29.333	5.6	17.22	na	23.24	0.15	130	7.0
H26	28.5	5.6	12.25	na	19.6	0.1	196	7.0
H30	28.5	5.6	12.3	na	19.64	0.1	196	7.0
M10	29.333		20.66	na				
M10A	29.333		20.66	na				
M11	29.333		20.67	na				
M12	29.333		20.73	na				
M12A	29.333		20.74	na				
M13	29.333		22.59	na				
M14	29.333		24.29	na				
M6	29.333		24.35	na				
M7	29.333		25.64	na				
TOR2	28.333		26.61	na				
BOR2	1.75		39.17	na				
UG1	1.75		50.37	na				
UG2	-3.0		52.46	na				
UG3	-3.0		52.63	na				
UG4	-3.0		53.0	na				
UG5	-3.0		53.09	na				
TEST	0.0		51.87	na	250.0			

The maximum velocity is 10.81 and it occurs in the pipe between nodes H29 and M12

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqiv	Len	Pipe Ftngs Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
H20	22.56	1.61		0.0	10.000	16.231		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
H21	22.56	0.0202		0.0	10.000	0.202		Vel = 3.56
H21	22.70	1.61		0.0	10.000	16.433		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
H22	45.26	0.0732		0.0	10.000	0.732		Vel = 7.13
H22	23.20	1.61	J	8.0	14.208	17.165		K Factor = 5.60
to		120.0		0.0	8.000	0.0		
M10	68.46	0.1574		0.0	22.208	3.496		Vel = 10.79
	0.0							
	68.46					20.661		K Factor = 15.06
H23	22.57	1.61		0.0	10.000	16.242		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
H24	22.57	0.0202		0.0	10.000	0.202		Vel = 3.56
H24	22.71	1.61		0.0	10.000	16.444		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
H25	45.28	0.0732		0.0	10.000	0.732		Vel = 7.14
H25	23.21	1.61	J	8.0	14.208	17.176		K Factor = 5.60
to		120.0		0.0	8.000	0.0		
M11	68.49	0.1575		0.0	22.208	3.498		Vel = 10.79
	0.0							
	68.49					20.674		K Factor = 15.06
H27	22.60	1.61		0.0	10.000	16.283		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
H28	22.6	0.0202		0.0	10.000	0.202		Vel = 3.56
H28	22.73	1.61		0.0	10.000	16.485		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
H29	45.33	0.0734		0.0	10.000	0.734		Vel = 7.14
H29	23.24	1.61	J	8.0	14.208	17.219		K Factor = 5.60
to		120.0		0.0	8.000	0.0		
M12	68.57	0.1579		0.0	22.208	3.506		Vel = 10.81
	0.0							
	68.57					20.725		K Factor = 15.06
H26	19.60	1.049		0.0	70.000	12.250		K Factor = 5.60
to		120.0		0.0	0.0	-0.361		
M10A	19.6	0.1254		0.0	70.000	8.775		Vel = 7.28
	0.0							
	19.60					20.664		K Factor = 4.31
H30	19.64	1.049		0.0	70.000	12.298		K Factor = 5.60
to		120.0		0.0	0.0	-0.361		
M12A	19.64	0.1258		0.0	70.000	8.808		Vel = 7.29
	0.0							
	19.64					20.745		K Factor = 4.31
M10	68.46	4.26		0.0	2.667	20.661		
to		120.0		0.0	0.0	0.0		
M10A	68.46	0.0011		0.0	2.667	0.003		Vel = 1.54
M10A	19.60	4.26		0.0	4.333	20.664		
to		120.0		0.0	0.0	0.0		
M11	88.06	0.0023		0.0	4.333	0.010		Vel = 1.98

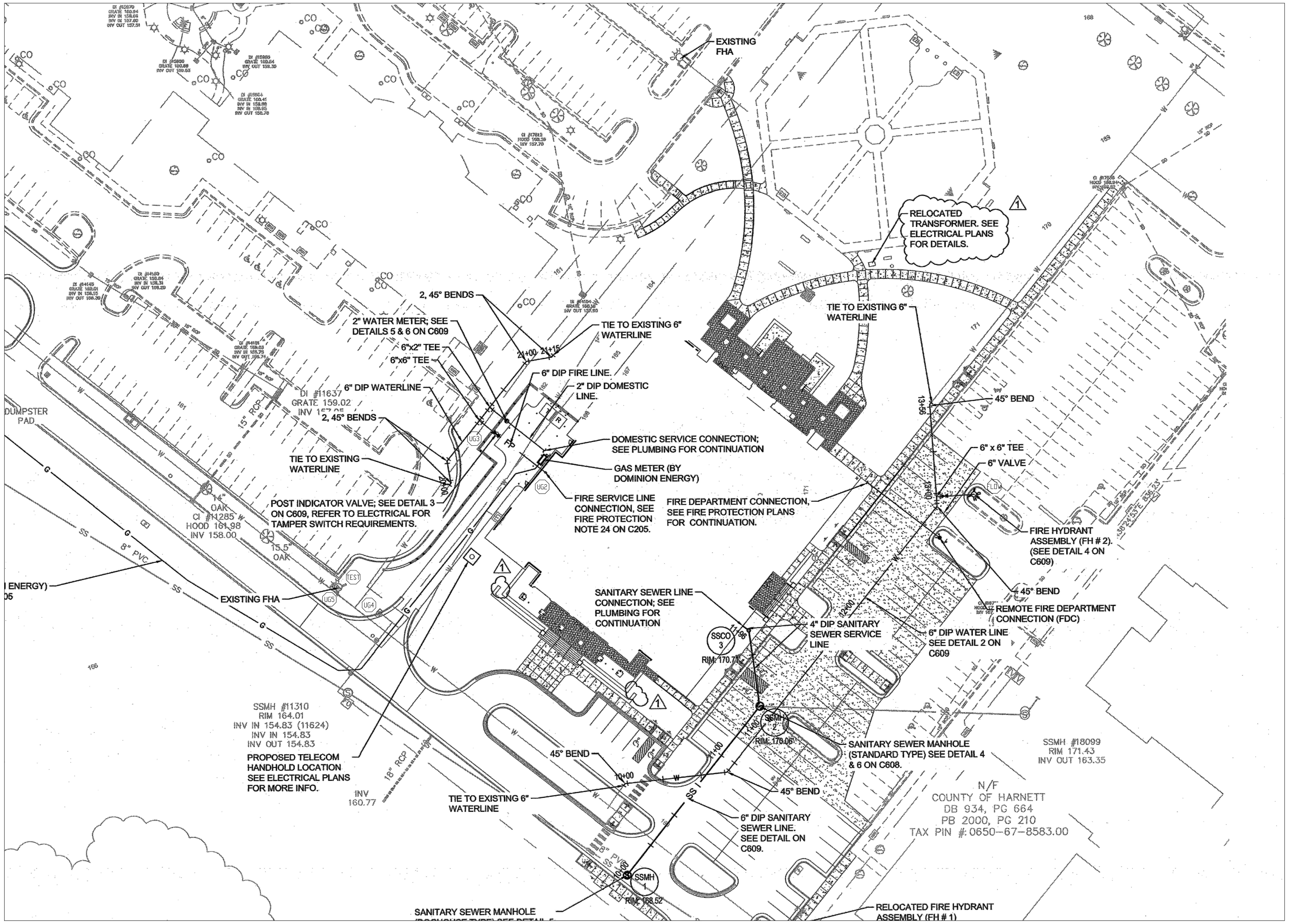
Final Calculations : Hazen-Williams

ALLIED FIRE PROTECTION
HARNETT COUNTY GSC

Date 10-14-19

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqiv	Len	Pipe Ftngs Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
M11	68.49	4.26		0.0	8.083	20.674		
to		120.0		0.0	0.0	0.0		
M12	156.55	0.0063		0.0	8.083	0.051		Vel = 3.52
M12	68.57	4.26		0.0	1.583	20.725		
to		120.0		0.0	0.0	0.0		
M12A	225.12	0.0126		0.0	1.583	0.020		Vel = 5.07
M12A	19.64	4.26	2I	18.434	87.292	20.745		
to		120.0	J	21.067	39.501	0.0		
M13	244.76	0.0145		0.0	126.793	1.844		Vel = 5.51
M13	0.0	4.26	J	21.067	95.917	22.589		
to		120.0		0.0	21.067	0.0		
M14	244.76	0.0145		0.0	116.984	1.701		Vel = 5.51
M14	0.0	4.26		0.0	4.167	24.290		
to		120.0		0.0	0.0	0.0		
M6	244.76	0.0144		0.0	4.167	0.060		Vel = 5.51
M6	0.0	4.26	2I	18.434	48.917	24.350		
to		120.0	J	21.067	39.501	0.0		
M7	244.76	0.0145		0.0	88.418	1.286		Vel = 5.51
M7	0.0	4.26	I	9.217	28.167	25.636		
to		120.0		0.0	9.217	0.433		
TOR2	244.76	0.0146		0.0	37.384	0.544		Vel = 5.51
TOR2	0.0	4.26	J	21.067	26.500	26.613		
to		120.0	Eql	24.359	45.426	11.513		
BOR2	244.76	0.0145		0.0	71.926	1.046		Vel = 5.51
BOR2	0.0	6.357	Zim	0.0	7.583	39.172		
to		120.0	I	12.573	12.573	11.156		* * Fixed Loss = 11.156
UG1	244.76	0.0020		0.0	20.156	0.041		Vel = 2.47
UG1	0.0	6.16	I	14.346	4.750	50.369		
to		140.0		0.0	14.346	2.057		
UG2	244.76	0.0018		0.0	19.096	0.035		Vel = 2.63
UG2	0.0	6.16	G	4.304	54.917	52.461		
to		140.0	J	35.864	40.168	0.0		
UG3	244.76	0.0018		0.0	95.085	0.172		Vel = 2.63
UG3	0.0	6.16	2H	14.346	150.333	52.633		
to		140.0	J	35.864	50.210	0.0		
UG4	244.76	0.0018		0.0	200.543	0.364		Vel = 2.63
UG4	0.0	6.16	J	35.864	16.000	52.997		
to		140.0		0.0	35.864	0.0		
UG5	244.76	0.0018		0.0	51.864	0.094		Vel = 2.63
UG5	0.0	6.16	G	4.304	3.500	53.091		
to		140.0	J	35.864	40.168	-1.299		
TEST	244.76	0.0018		0.0	43.668	0.079		Vel = 2.63
	250.00							Qa = 250.00
	494.76					51.871		K Factor = 68.70

EQL= EQUIV PIPE LENGTH OF INTEGRATED RISER, BUTTERFLY VALVE AND FLOW SWITCH AS INDICATED ON MANUF CUT SHEET



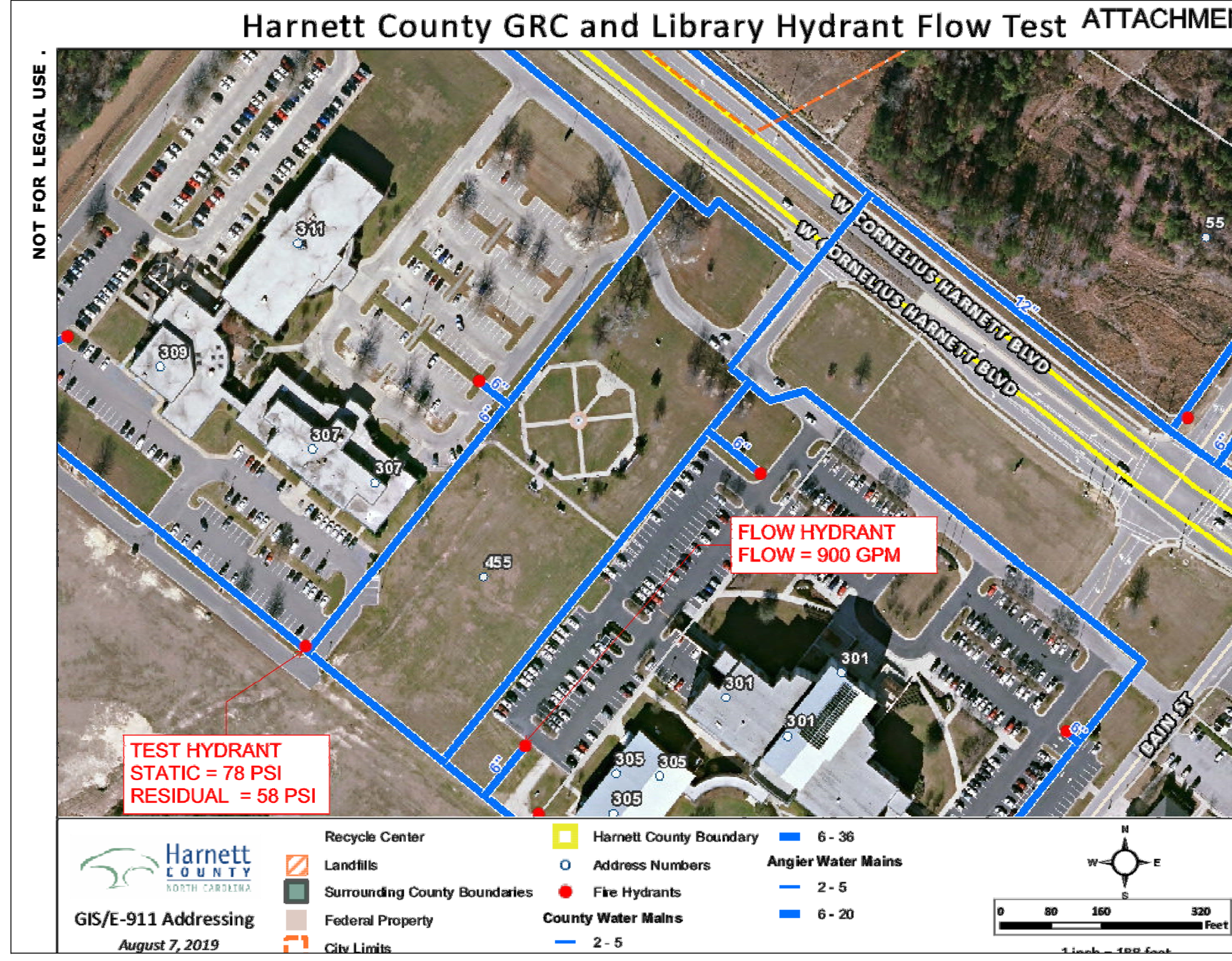
SITE PLAN

1/32" = 1'

Harnett County GRC and Library Hydrant Flow Test

ATTACHMENT B

NOT FOR LEGAL USE



FIRE HYDRANT FLOW TEST DATA

NOT TO SCALE - HYDRAULIC REFERENCE ONLY

GENERAL NOTES

SPRINKLER SYSTEM DESIGN

FOR AREAS SUCH AS OFFICES AND PUBLIC SPACES, ETC. THE SPRINKLER SYSTEM SHALL BE DESIGNED FOR LIGHT HAZARD OCCUPANCY AND DESIGN DENSITY OF 0.10 GPM OVER THE MOST REMOTE 1,500 SQ.FT. PLUS A 100 GPM HOSE ALLOWANCE. MAXIMUM SPRINKLER HEAD SPACING NOT TO EXCEED 225 SQ.FT. STORAGE AREAS, MECHANICAL PENTHOUSES, AND HOUSEKEEPING AREAS ARE ORDINARY GROUP 1 HAZARD WITH A DESIGN DENSITY OF 0.15 GPM OVER THE MOST REMOTE 1500 SQ.FT. AND MAXIMUM HEAD SPACING OF 130 SQ.FT.

AS PER NFPA-13, 2013 EDITION SECTION 11.2.3.2.3.1; A 30% REDUCTION IN THE REMOTE AREA SIZE IS PERMITTED TO BE TAKEN IN THE LEVEL 2 ADULT MAKER ROOM (REMOTE AREA #2) ALTHOUGH IT IS A LIGHT HAZARD AREA, IT IS WAS CALCULATED AND IS SPACED AS IF IT WERE ORDINARY HAZARD AND USED AS A CHECK CALCULATION.

SPRINKLER DEFLECTOR LOCATIONS

CEILINGS ARE DEFINED AS SMOOTH FLAT CEILINGS HAVING NO IRREGULARITIES. SPRINKLER HEAD DEFLECTORS TO BE LOCATED AT THE CEILING AS PER THE MANUFACTURERS LITERATURE.

IN EXPOSED CONSTRUCTION WHERE BEAMS ARE SPACED GREATER THAN 7'-6" ON CENTER, SPRINKLER HEAD DEFLECTORS ARE TO BE LOCATED WITHIN EACH BEAM POCKET WITH THE DEFLECTORS BETWEEN 1"-12" BELOW TOP OF STEEL.

IN EXPOSED CONSTRUCTION WHERE BEAMS ARE SPACED LESS THAN 7'-6" ON CENTER, SPRINKLER HEAD DEFLECTORS ARE PERMITTED TO BE LOCATED BETWEEN 1"-6" BELOW BEAM FLANGE WITH AN OVERALL OF 22" MAX BELOW TOP OF DECK.

OTHER NOTES

ALL DUCT AND SIMILAR OBSTRUCTIONS 48" AND LARGER IN EXPOSED CONSTRUCTION SHALL HAVE PROTECTION BENEATH. ALL UPRIGHT HEADS SHALL BE EQUIPPED WITH WIRE CAGE HEAD GUARDS.

PIPE MATERIALS

NO SPRINKLER PIPING TO BE PAINTED BY THIS CONTRACTOR

ALL PIPE FOR WET SYSTEMS TO BE BLACK STEEL WITH DUCTILE IRON GROOVED FITTINGS OR CAST IRON THREADED FITTINGS WITH JOINTS AS PER NFPA-13, 2013 EDITION AND AS PER THE FOLLOWING:

-1" Sch 40 RIGID PIPE FOR ARMOVER PIPING AS NEEDED
-FLEXIBLE SPRINKLER CONNECTION BETWEEN RIGID PIPING AND THE SPRINKLER HEAD
-Sch 40 PIPE FOR SPRINKLER BRANCHLINE PIPING
-Sch 10 PIPE FOR BULK FEED AND SPRINKLER CROSSMAIN PIPING
REFER TO PLANS FOR EXACT SIZES

SMALL ROOM RULE

SMALL ROOM DEFINITION AS PER NFPA-13, 2013 EDITION:
A ROOM OF LIGHT HAZARD OCCUPANCY CLASSIFICATION HAVING UNOBSTRUCTED CONSTRUCTION AND FLOOR AREAS NOT EXCEEDING 800 SQ.FT. THAT ARE ENCLOSED BY WALLS AND A CEILING. OPENINGS TO THE ADJOINING SPACE ARE PERMITTED IF THE MINIMUM LINTEL DEPTH IS 8" FROM THE CEILING.
PER NFPA-13, 2013 EDITION 8.6.3.2.4.1 SPRINKLERS ARE ALLOWED TO BE SPACED NOT MORE THAN 9'-0" OFF ANY SINGLE WALL AS LONG AS SPRINKLER SPACING AND AREA LIMITATIONS ARE NOT EXCEEDED.

SPRINKLER DESIGN DATA

Project Name: HARNETT COUNTY GSC		System: WET
Project Street Address: 455 MCKINNY PKWY LILLINGTON, NC		Sys. Sq. Ft.: 61900
Suite: --	Floor#: 2	Ceiling Height: Varies
Designed By: Allied Fire Protection Inc.	Phone: 919-772-9200	Total Bldg. Hgt.: Varies
Occupancy: OFFICE	Hazard: LIGHT	

Design Summary

	System #1	System #2				
Design Method	Calculated	Calculated				
Design Area #	1	2				
Location	CLERESTORY	ADULT LEARNING				
Type of System	WET	WET				
Hazard Class	LIGHT	OH1				
Criteria From	NFPA 13	NFPA 13				
Design Area	1859 SF	1050 SF				
Sprinkler Spacing	168 S.F.	130 S.F.				
Density	0.10 GPM	0.15 GPM				
K-factor	5.6	5.6				
Hose Allowance	100 GPM	250 GPM				
# Design Sprinklers	15	11				
Special App. Spk.	N/A	N/A				
Requirement @	TEST NODE	TEST NODE				
G.P.M. Req'd	363.723	494.760				
P.S.I. Req'd	58.833	51.871				
Safety Factor @	TEST	TEST				
Safety Factor (psi)	15.42	19.52				
Dry Sys. Vol. (gal)	N/A	N/A	N/A	N/A	N/A	N/A

Water Supply Information

Tested by	DEWBERRY	Date/Time	8/7/2019	Pressure Hydrant	SHOWN BELOW
Hydrant Elevation		Flow Hydrant # 1	SHOWN BELOW	Flow Hydrant #2	
Static (PSI)	78	Residiual (PSI)	58	Flow (gpm)	900
Water test data required					

Fire Pump Data N/A

Rated G.P.M.		Rated Pressure		Horsepower	
Diesel/Electric		Churn Pressure		Style of pump	
Combined Discharge		150% Flow (suction)		150% Flow (gpm)	
Certified pump curve required					

If Storage is Greater than 12 Feet Complete Commodity Storage Design Information

Comodity Description						Storage Type (Rack,Bin,Pile)					
Comodity Class			Storage Height				Clearance				
Stable/Unstable			Open/Close Array				Wet/Dry System				
Figure #	Curve #		Density / Area	Height Factor	Clear Factor	Array Factor	Dry Penalty	Design	Minimum Design	Final Design	
WL 1054		Initial									
		Secondary									
Is system compliant with Chapter 23 (FPC)					Is storage area layout, rack, and pile plan included?						

NO STORAGE OVER 12'-0"

NICET CERTIFIED
ALEX CHERRY Jr. - C.E.T.
LEVEL III CERTIFICATION #109758
WATER-BASED SYSTEMS LAYOUT

NORTH CAROLINA STATE LICENSE # FS 16286

SITE PLAN

HARNETT COUNTY GSC
455 MCKINNY PKWY
LILLINGTON, NC

ALLIED FIRE PROTECTION, INC.
License: NC 16286
80 Rupert Road
Raleigh, North Carolina 27603
Phone: 919-772-9200
Fax: 919-779-4220
www.alliedfire.net

Date: DATE
Scale: 1/8"=1'-0"
Job No.: 203-I-19
Drawn By: MSG
Sheet No.: FP-1 OF 7

SPRINKLER LEGEND

SYMBOL	MANUF.	TYPE	SIN#	FINISH	TEMP	K.FACTOR	ORIF.	NPT	TOTAL
⦿	VICTAULIC	QR-SSP	V2708	CHROME	155°	5.6	1/2	1/2	507
○	VICTAULIC	QR-SSU	V2704	BRASS	155°	5.6	1/2	1/2	42
●	GLOBE	QR-SSP CONCEAL	GL5606	WHITE CVR	155°	5.6	1/2	1/2	1
▼	GLOBE	QR-SSP-HSW	GL5626	BRASS	155°	5.6	1/2	1/2	4
⚠	VICTAULIC	DRY-QR-SSP	V3506	CHROME	155°	5.6	1/2	1	4
⊠	TYCO	TAMPER RESIST CONC PENDANT	TY3281	WHITE	155°	5.6	1/2	1/2	1
TOTAL SPRINKLERS SHOWN IN THIS AREA									0
TOTAL SPRINKLERS REQUIRED ON THIS CONTRACT									559

REVISIONS

No.	Description	Date	Name
1			
2			
3			
4			
5			
6			

■ Shop Drawings □ Working Drawings □ As-Built Drawings

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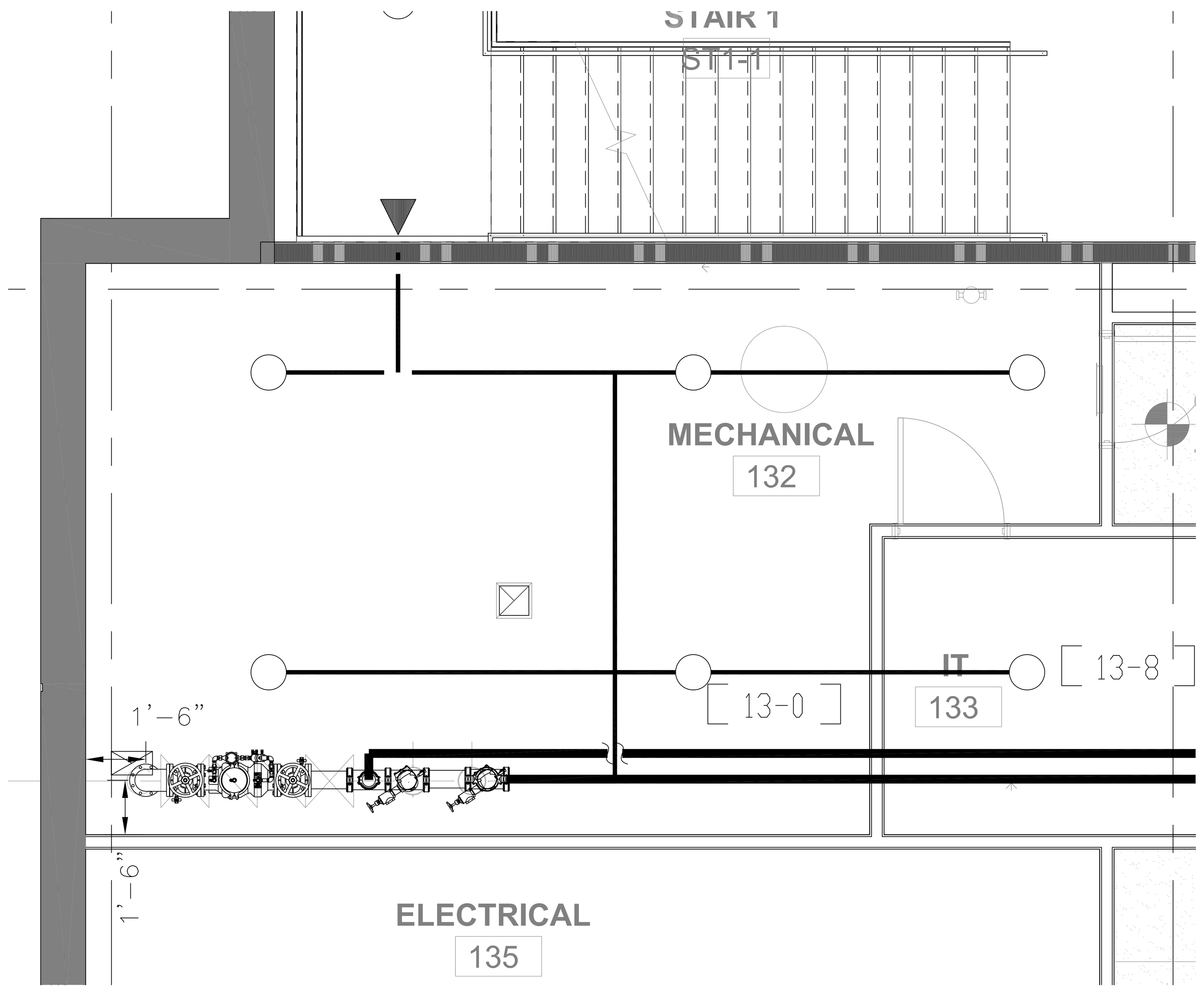
SYSTEM DESIGN CRITERIA

TYPE SYSTEM: ■ WET □ DRY □ DELUGE □ PREACTION □ ANTI-FREEZE
NFPA STANDARD: ■ #13 □ #13D □ #13R □ #14 □ #20 □ #22 □ #24 □ #231 □ #231C □ #15 □ #16 □ #409
OCCUPANCY: OFFICE/LIBRARY HAZARD: LIGHT PIPE ID REQUIRED: NO
MAXIMUM SPACING: 225 SF LOCAL HOSE THREADS: N/A SLEEVES REQUIRED: NO
SPRINKLERS ARE REQUIRED TO BE LOCATED IN THE CENTER OF THE CEILING TILES.

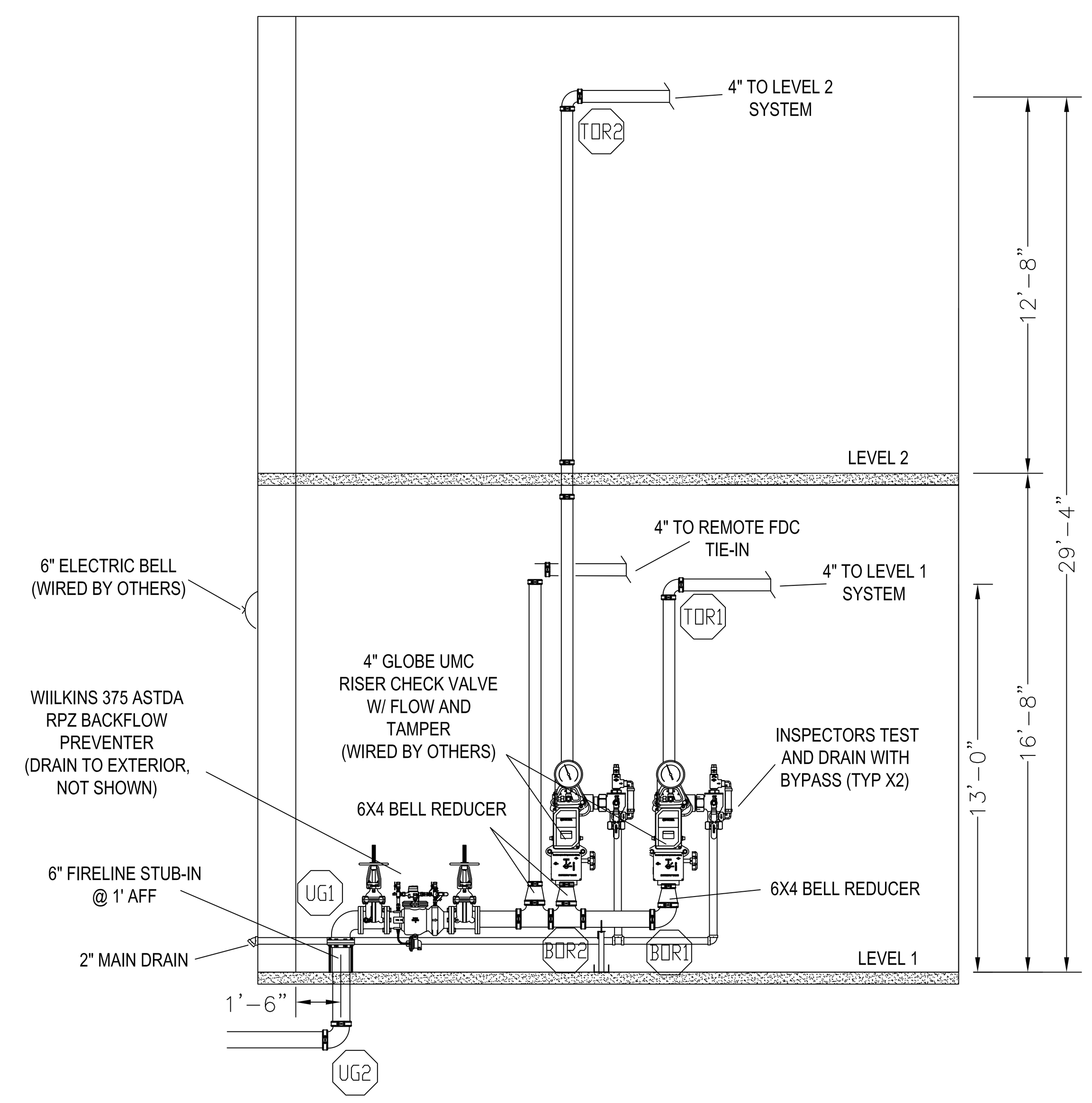
PIPE TYPES AND FITTING TYPES: ■ FOREIGN □ DOMESTIC
LINE PIPING: SCH. 40 BLACK PIPE — LINE FITTINGS: BLACK D.I. SCREWED
MAIN PIPING: SCH. 10 BLACK PIPE — MAIN FITTINGS: STD FINISH SHORT RADIUS GRVD

APPROVING AGENCIES

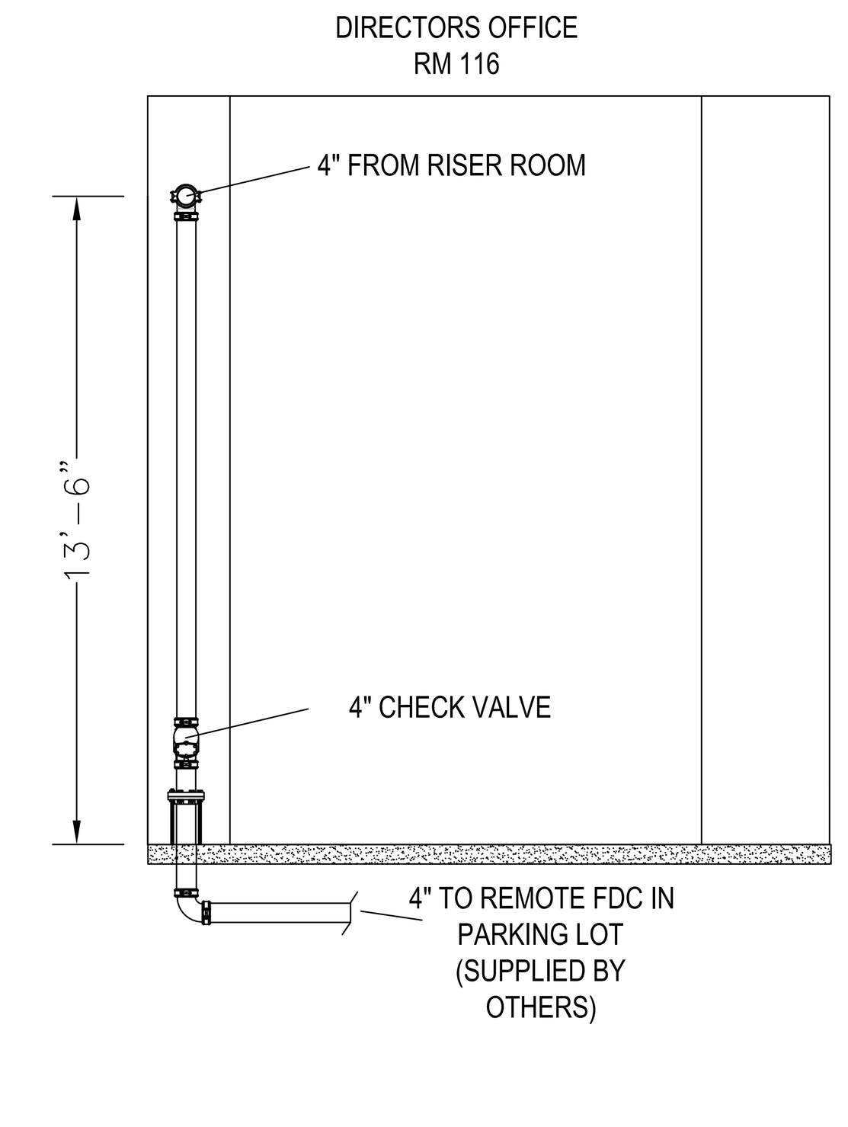
APPROVING AUTHORITY: HARNETT COUNTY
UNDERWRITER:
GENERAL CONTRACTOR: BALFOUR BEATTY CONST
ADDRESS: 406 MACDOWELL ST
CITY & STATE: RALEIGH, NC 27601
PHONE NO.: 919-233-5001
FAX NO.:



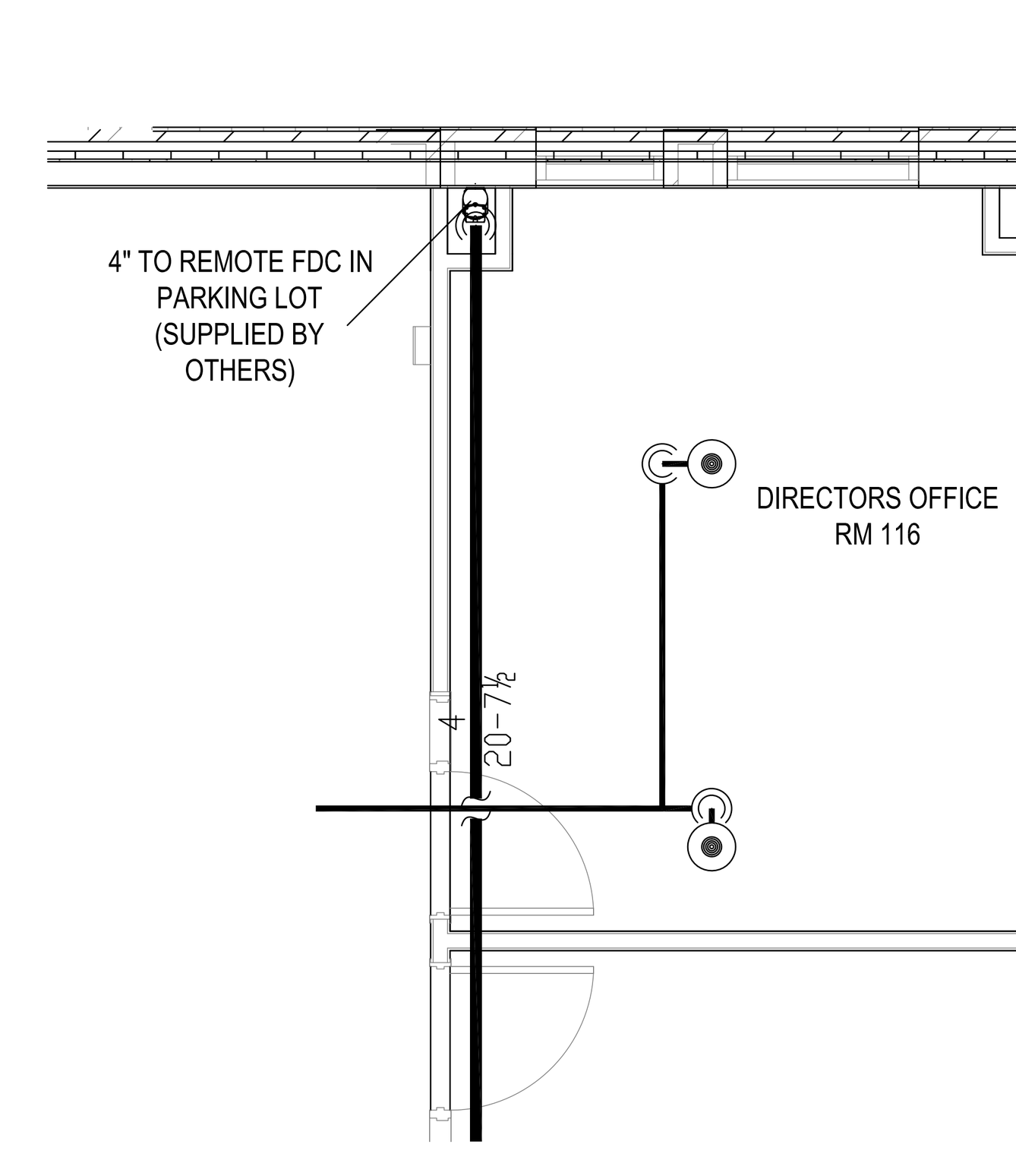
RISER ROOM PLAN VIEW
3/8" = 1'



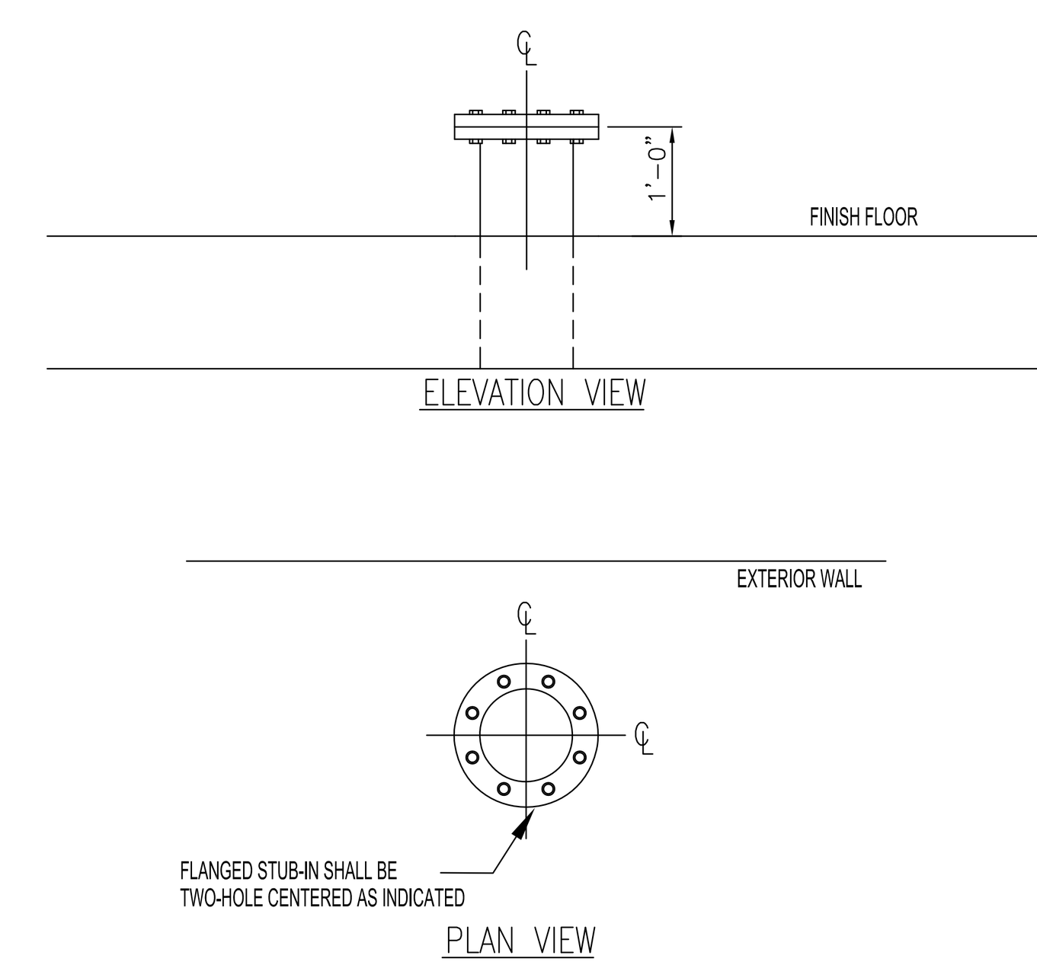
RISER DETAIL
1/4" = 1'



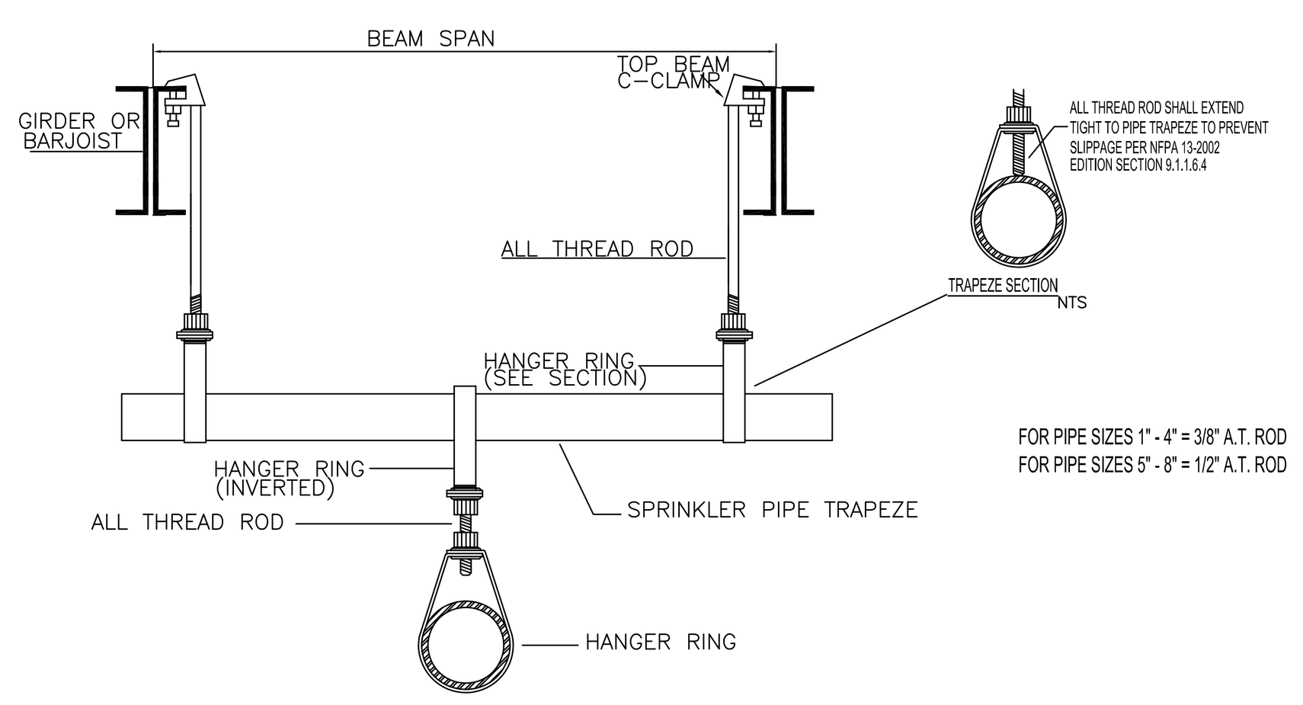
FDC STUB-IN DETAIL
1/4" = 1'



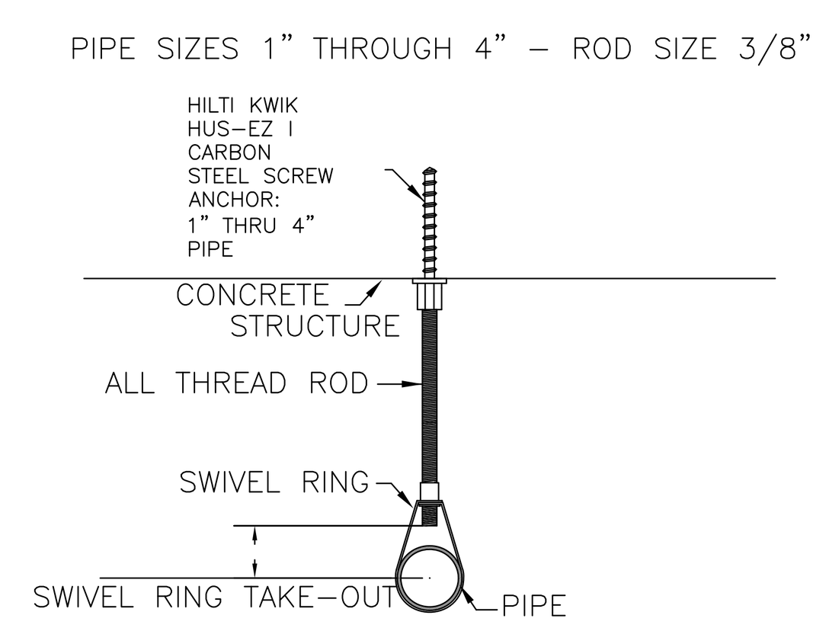
FDC STUB-IN PLAN VIEW
1/4" = 1'



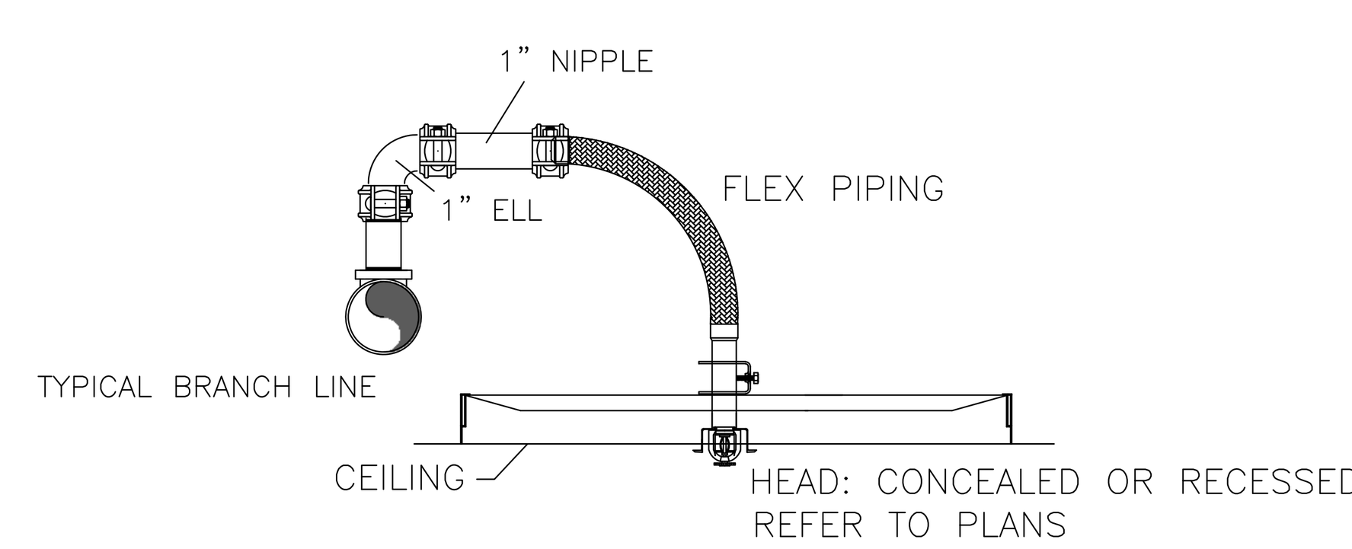
FIRE SUPPLY 6" STUB-IN DETAIL
NOT TO SCALE



TRAPEZE HANGER ASSEMBLY
NOT TO SCALE

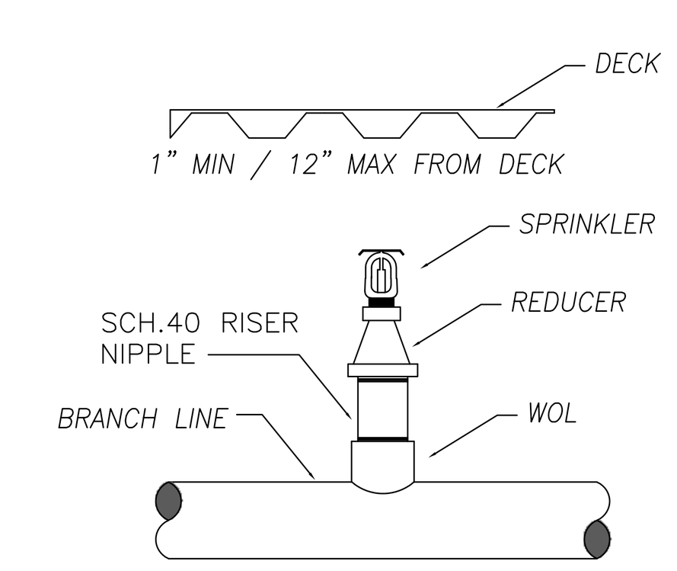


HILTI CONCRETE SCREW
NOT TO SCALE

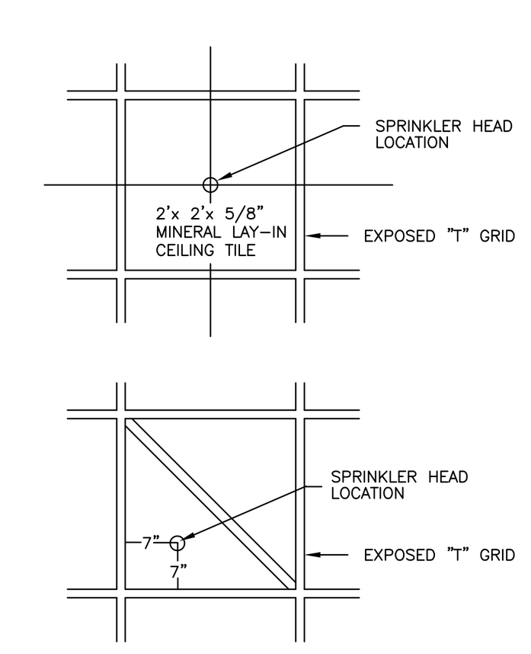


AH-1 FLEXIBLE SPRINKLER CONNECTION: VICTAULIC VICFLEX-BRAIDED	
TOTAL EQUIVALENT LENGTH ALLOWED (PER HYD. CALC.)	70 FEET
SUMMARY OF ITEMS TO DETERMINE EQUIVALENT LENGTH OF 1" PIPE	
36" FLEXIBLE CONNECTION WITH 5.6K HEAD (UP TO 2 BENDS)	43 FEET
48" FLEXIBLE CONNECTION WITH 5.6K HEAD (UP TO 2 BENDS)	57 FEET
36" FLEXIBLE CONNECTION WITH 8.0K HEAD (UP TO 2 BENDS)	NA
48" FLEXIBLE CONNECTION WITH 8.0K HEAD (UP TO 2 BENDS)	NA
STANDARD 1" 90 deg. ELBOW	2 FEET
STANDARD 1" STRAIGHT TEE	5 FEET
1'-0" OF 1" SCH. 40 PIPE	1 FOOT

FLEXIBLE SPRINKLER DETAIL
NOT TO SCALE



TYPICAL UPRIGHT
NOT TO SCALE



CENTER OF TILE DETAIL FOR 2X2 TILES & DIAGONAL TILES
NOT TO SCALE

NICET CERTIFIED
ALEX CHERRY Jr. - C.E.T.
LEVEL III CERTIFICATION #109758
WATER-BASED SYSTEMS LAYOUT

TRAPEZE INSTALLATION REQUIREMENTS

SPAN OF TRAPEZE (Schedule 10)	NOMINAL PIPE SIZE SUPPORTED							
	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"
1'-6"	1"	1"	1"	1"	1"	1"	1 1/4"	1 1/4"
2'-0"	1"	1"	1"	1 1/4"	1 1/4"	11/4"	1 1/4"	1 1/2"
2'-6"	1 1/4"	1 1/4"	11/4"	1 1/4"	1 1/4"	11/4"	1 1/2"	2"
3'-0"	1 1/4"	1 1/4"	11/4"	1 1/4"	1 1/2"	1 1/2"	1 1/2"	2"
4'-0"	1 1/2"	1 1/2"	11/2"	1 1/2"	2"	2"	2"	2 1/2"
5'-0"	2"	2"	2"	2"	2"	2"	2 1/2"	2 1/2"
6'-0"	2"	2"	2"	2"	2"	2 1/2"	2 1/2"	3"
7'-0"	2"	2"	2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	3"
8'-0"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	3"
9'-0"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	3"	4"
10'-0"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	3"	3"	4"

HANGER INSTALLATION REQUIREMENTS

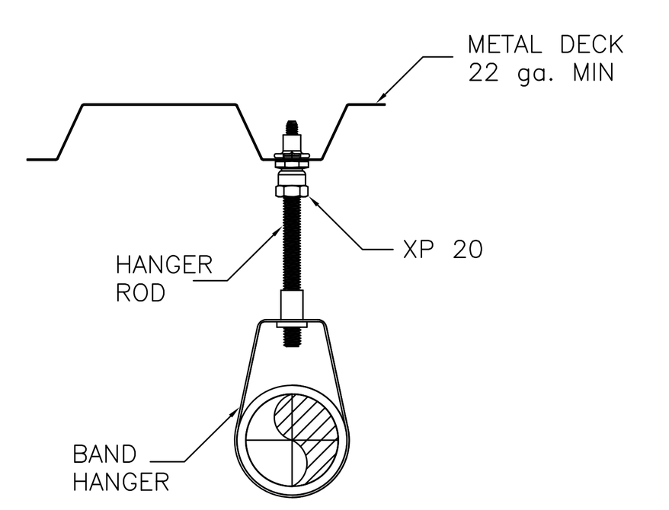
	MAXIMUM DISTANCE BETWEEN HANGERS								
NOMINAL PIPE SIZE	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"
BLAZEMASTER CPVC	5'-6"	6'-0"	6'-6"	7'-0"	8'-0"	9'-0"	10'-0"	n/a	n/a
THREADED LIGHTWALL	n/a	12'-0"	12'-0"	12'-0"	12'-0"	12'-0"	12'-0"	n/a	n/a
STEEL PIPE (SCH 10/SCH 40)	n/a	12'-0"	12'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"

100 PSI STATIC PRESSURE ON SYSTEM REQUIRES UP-LIFT RESTRAINT WITHIN 12 INCHES HORIZONTALLY OF HEAD FOR ARM-OVERS AND END OF BRANCHLINE.

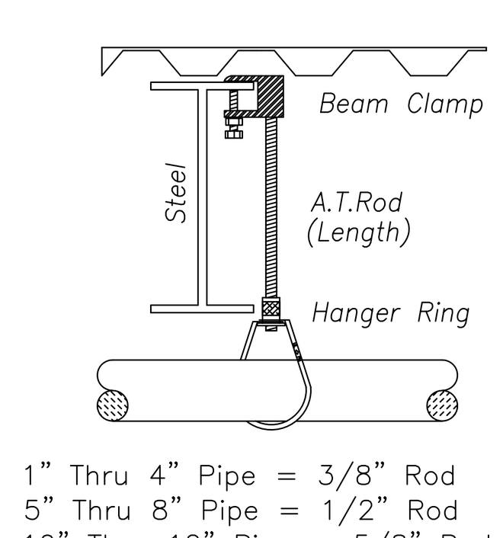
THE UNSUPPORTED LENGTH BETWEEN THE END SPRINKLER AND THE LAST HANGER ON THE LINE SHALL NOT EXCEED 36" FOR 1" PIPE, 48" FOR 1-1/4" PIPE, AND 60" FOR 1-1/2" PIPE OR LARGER.

THE CUMULATIVE HORIZONTAL LENGTH OF AN UNSUPPORTED ARMOVER TO A SPRINKLER, SPRINKLER DROP, OR SPRIG-UP SHALL NOT EXCEED 24"

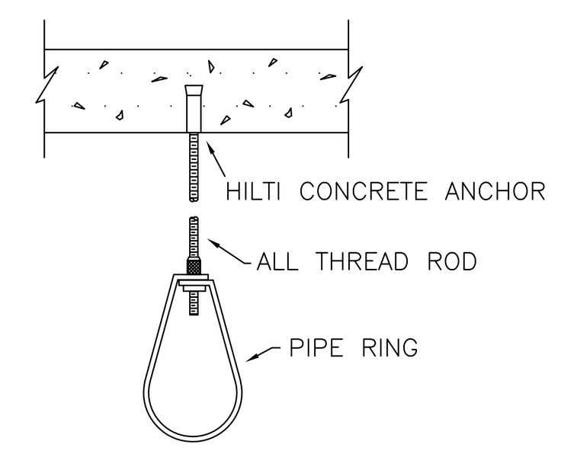
PIPE HANGERS SHALL BE INSTALLED AS REQUIRED BY NFPA FOR SUPPORTING SPRINKLER PIPING.
NO OTHER PIPING AND/ OR DEVICES ARE TO BE ATTACHED TO THE SPRINKLER PIPE HANGER SYSTEM UNLESS THE HANGER HAS BEEN SPECIFICALLY DESIGNED FOR THE ADDITIONAL LOADING.
THE CONTRACT DOES NOT INCLUDE ANY MATERIAL OR DEVICE TO IMPROVE THE STRUCTURAL STRENGTH OF THE BUILDING TO ENABLE IT TO CARRY THE LOAD OF THE FIRE PROTECTION SYSTEM.



SAMMY XP-20 HANGER ATTACHMENT
NOT TO SCALE



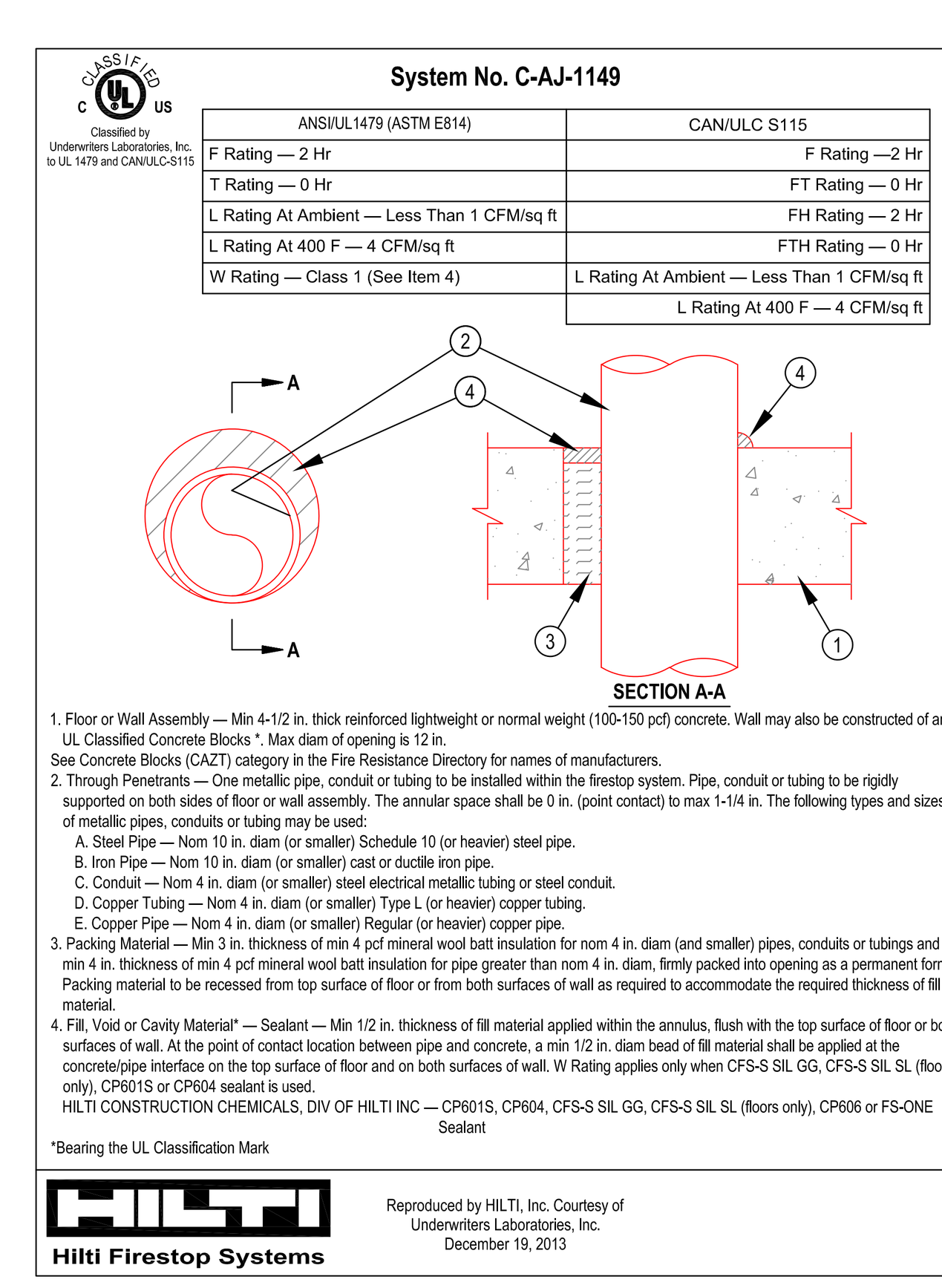
BEAM CLAMP DETAIL
NOT TO SCALE

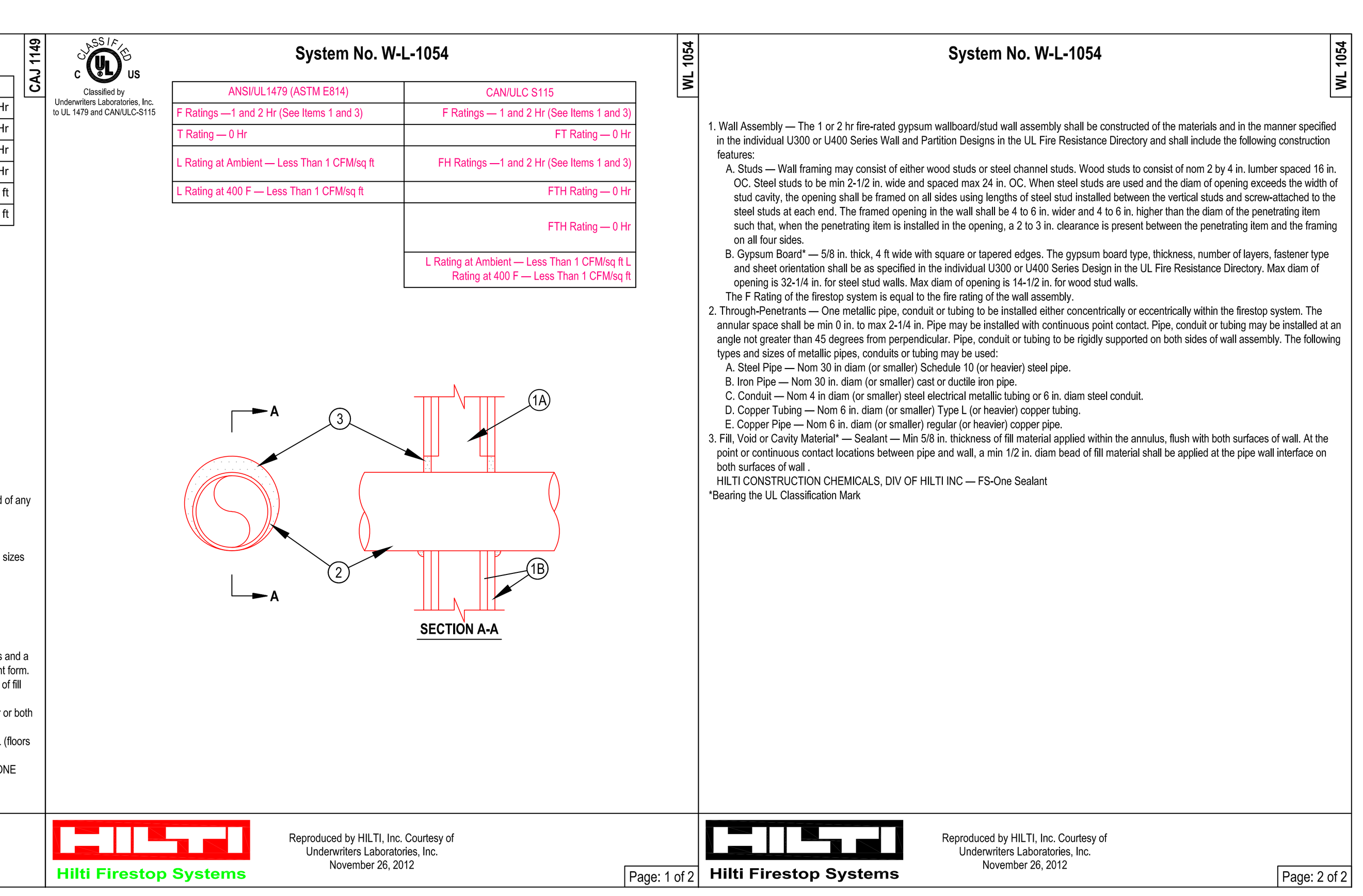


CONC. DROP-IN
NOT TO SCALE

PIPING WEIGHTS FOR DETERMINING HORIZONTAL LOAD

Nominal Dimensions in.	mm	Weight of Water-Filled Pipe lb/ft	kg/m
1	25	2.05	3.05
1 1/4"	32	2.93	4.36
1 1/2"	40	3.61	5.37
2	50	5.13	7.63
2 1/2"	65	7.89	11.74
3	80	10.82	16.10
3 1/2"	90	13.48	20.06
4	100	16.40	24.41
5	125	23.47	34.93
6	150	31.69	47.16
8	200	47.70	70.99
Schedule 10 Pipe			
1	25	1.81	2.69
1 1/4"	32	2.52	3.75
1 1/2"	40	3.04	4.52
2	50	4.22	6.28
2 1/2"	65	5.89	8.77
3	80	7.94	11.82
3 1/2"	90	9.78	14.55
4	100	11.78	17.53
5	125	17.30	25.75
6	150	23.03	34.27
8	200	40.08	59.65


System No. C-AJ-1149
SECTION A-A
Hilti Firestop Systems


System No. W-L-1054
SECTION A-A
Hilti Firestop Systems
Page: 1 of 2

System No. W-L-1054
Hilti Firestop Systems
Page: 2 of 2

NORTH CAROLINA STATE LICENSE # FS 16286

DETAIL PLAN

HARNETT COUNTY GSC

455 MCKINNY PKWY
LILLINGTON, NC

ALLIED FIRE PROTECTION, INC.
License: NC 16286
80 Rupert Road
Raleigh, North Carolina 27603
Phone: 919-772-9200
Fax: 919-779-4220
www.alliedfire.net

Date	Scale	Job No.	Drawn By	Sheet No.
DATE	1/8"=1'-0"	203-I-19	MSG	FP-2 OF 7

SPRINKLER LEGEND

SYMBOL	MANUF.	TYPE	SIN#	FINISH	TEMP	K.FACTOR	ORIF.	NPT	TOTAL
⊙	VICTAULIC	QR-SSP	V2708	CHROME	155°	5.6	1/2	1/2	249
○	VICTAULIC	QR-SSU	V2704	BRASS	155°	5.6	1/2	1/2	19
●	GLOBE	QR-SSP CONCEAL	GL5606	WHITE CVR	155°	5.6	1/2	1/2	1
▼	GLOBE	QR-SSP-HSW	GL5626	BRASS	155°	5.6	1/2	1/2	4
◬	VICTAULIC	DRY-QR-SSP	V3506	CHROME	155°	5.6	1/2	1	4
⊠	TYCO	TAMPER RESIST CONC PENDANT	TY3281	WHITE	155°	5.6	1/2	1/2	1
TOTAL SPRINKLERS SHOWN IN THIS AREA									278
TOTAL SPRINKLERS REQUIRED ON THIS CONTRACT									559

REVISIONS

No.	Description	Date	Name
1			
2			
3			
4			
5			
6			

■ Shop Drawings ☐ Working Drawings ☐ As-Built Drawings

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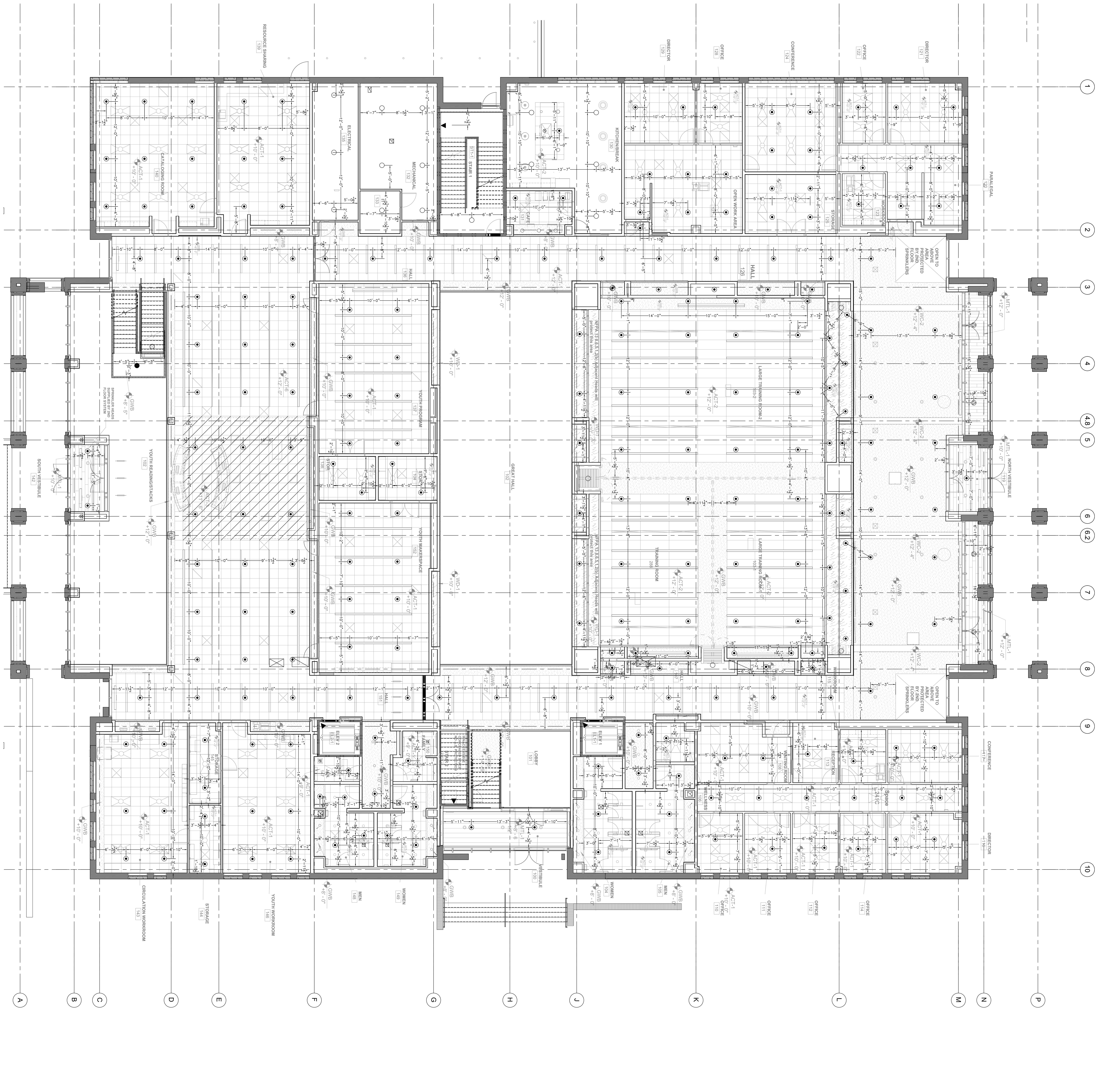
TYPE SYSTEM: ■ WET ☐ DRY ☐ DELUGE ☐ PREACTION ☐ ANTI-FREEZE
NFPA STANDARD: ■ #13 ☐ #13D ☐ #13R ☐ #14 ☐ #20 ☐ #22 ☐ #24 ☐ #231 ☐ #231C ☐ #15 ☐ #16 ☐ #409
OCCUPANCY: OFFICE/LIBRARY HAZARD: LIGHT PIPE ID REQUIRED: NO
MAXIMUM SPACING: 225 SF LOCAL HOSE THREADS: N/A SLEEVES REQUIRED: NO
SPRINKLERS ARE REQUIRED TO BE LOCATED IN THE CENTER OF THE CEILING TILES.

PIPE TYPES AND FITTING TYPES

■ FOREIGN ☐ DOMESTIC
LINE PIPING: SCH. 40 BLACK PIPE — LINE FITTINGS: BLACK D.I. SCREWED
MAIN PIPING: SCH. 10 BLACK PIPE — MAIN FITTINGS: STD FINISH SHORT RADIUS GRVD

APPROVING AGENCIES

APPROVING AUTHORITY: HARNETT COUNTY
UNDERWRITER:
GENERAL CONTRACTOR: BALFOUR BEATTY CONST
ADDRESS: 406 MACDOWELL ST
CITY & STATE: RALEIGH, NC 27601
PHONE NO.: 919-233-5001
FAX NO.:



PLAN NORTH

TOTAL AREA OF PROTECTION ± 61,900 SQ.FT.

LEVEL 1 RCP

1/8" = 1'-0"

GRAPHIC SCALE: 1/8" = 1'- 0"

NICET CERTIFIED
ALEX CHERRY Jr. - C.E.T.
LEVEL III CERTIFICATION #109758
WATER-BASED SYSTEMS LAYOUT

APPROVING AGENCIES	
APPROVING AUTHORITY:	HARNETT COUNTY
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OCCUPANCY: OFFICE/LIBRARY HAZARD: LIGHT PIPE ID REQUIRED: NO

MAXIMUM SPACING: 225 SF LOCAL HOSE THREADS: N/A SLEEVES REQUIRED: NO

SPRINKLERS ARE REQUIRED TO BE LOCATED IN THE CENTER OF THE CEILING TILES.

■ FOREIGN **PIPE TYPES AND FITTING TYPES** ☐ DOMESTIC

LINE PIPING: SCH. 40 BLACK PIPE	LINE FITTINGS: BLACK D.I. SCREWED
MAIN PIPING: SCH. 10 BLACK PIPE	MAIN FITTINGS: STD FINISH SHORT RADIUS GRVD

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REVISIONS

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4			
5			
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SPRINKLER LEGEND

SYMBOL	MANUF.	TYPE	SIN#	FINISH	TEMP	K.FACTOR	ORIF.	NPT	TOTAL
◉	VICTAULIC	QR-SSP	V2708	CHROME	155°	5.6	1/2	1/2	249
○	VICTAULIC	QR-SSU	V2704	BRASS	155°	5.6	1/2	1/2	19
●	GLOBE	QR-SSP CONCEAL	GL5606	WHITE CVR	155°	5.6	1/2	1/2	1
◀	GLOBE	QR-SSP-HSW	GL5626	BRASS	155°	5.6	1/2	1/2	4
◬	VICTAULIC	DRY-QR-SSP	V3506	CHROME	155°	5.6	1/2	1	4
⊗	TYCO	TAMPER RESIST CONC PENDANT	TY3281	WHITE	155°	5.6	1/2	1/2	1
TOTAL SPRINKLERS SHOWN IN THIS AREA									278
TOTAL SPRINKLERS REQUIRED ON THIS CONTRACT									559

NORTH CAROLINA STATE LICENSE # FS 16286

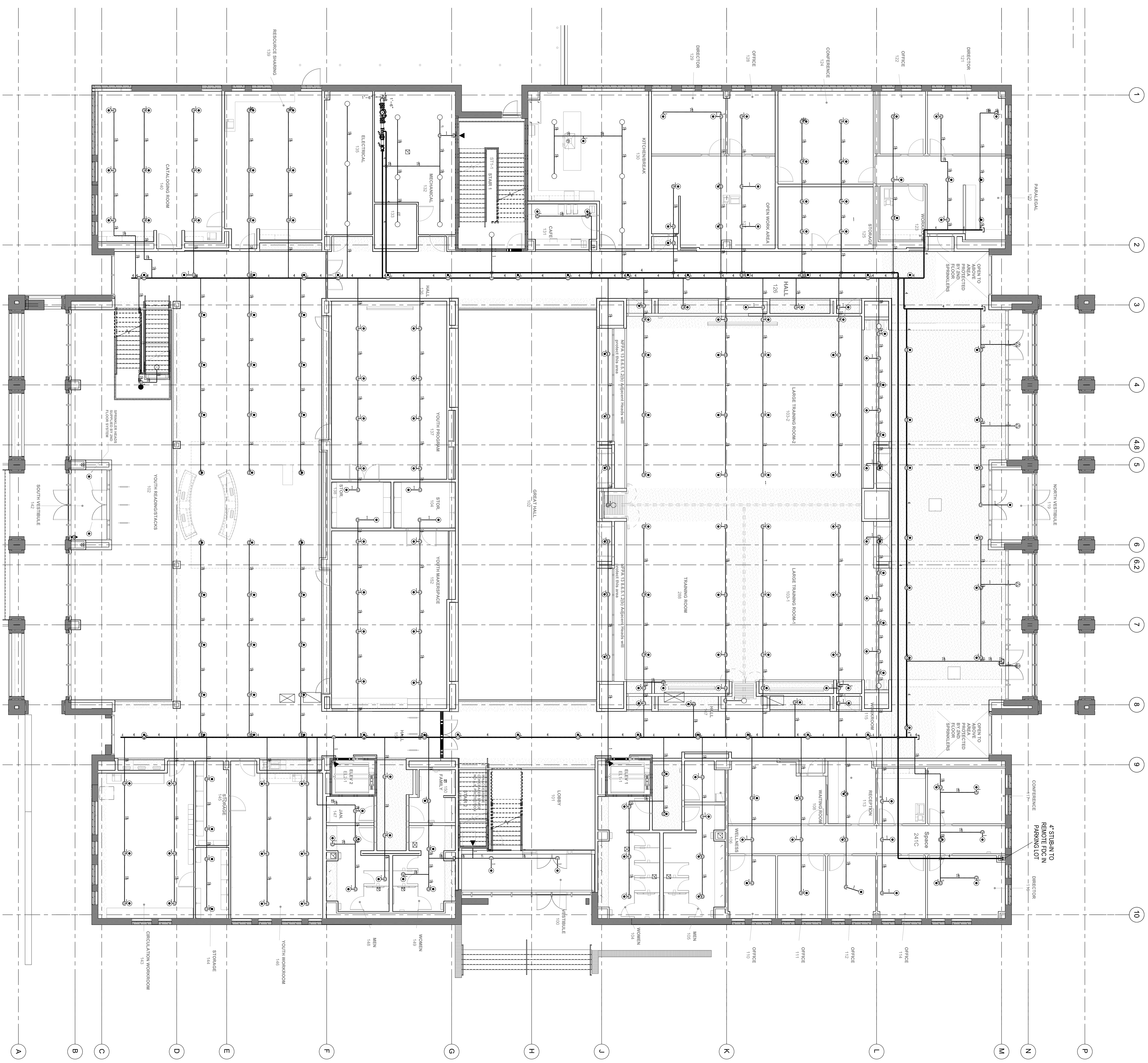
LEVEL 1 REFLECTED CEILING PLAN

HARNETT COUNTY GSC

455 MCKINNY PKWY
LILLINGTON, NC

ALLIED FIRE PROTECTION, INC.
License: NC 16286
80 Rupert Road
Raleigh, North Carolina 27603
Phone: 919-772-9200
Fax: 919-779-4220
www.alliedfire.net

Date	DATE
Scale	1/8"=1'-0"
Job No.	203-I-19
Drawn By	MSG
Sheet No.	FP-3 OF 7



TOTAL AREA OF PROTECTION ± 61,900 SQ.FT.

PLAN NORTH

LEVEL 1 PIPING PLAN

1/8" = 1'-0"

GRAPHIC SCALE: 1/8" = 1'- 0"

NICET CERTIFIED
ALEX CHERRY Jr. - C.E.T.
LEVEL III CERTIFICATION #109758
WATER-BASED SYSTEMS LAYOUT

APPROVING AGENCIES	
APPROVING AUTHORITY:	HARNETT COUNTY
UNDERWRITER:	
GENERAL CONTRACTOR:	BALFOUR BEATTY CONST
ADDRESS:	406 MACDOWELL ST
CITY & STATE:	RALEIGH, NC 27601
PHONE NO.:	919-233-5001
FAX NO.:	

SYSTEM DESIGN CRITERIA

TYPE SYSTEM: ■ WET ☐ DRY ☐ DELUGE ☐ PREACTION ☐ ANTI-FREEZE
NFPA STANDARD: ■ #13 ☐ #13D ☐ #13R ☐ #14 ☐ #20 ☐ #22 ☐ #24 ☐ #231 ☐ #231C ☐ #15 ☐ #16 ☐ #409
OCCUPANCY: OFFICE/LIBRARY — HAZARD: LIGHT — PIPE ID REQUIRED: NO
MAXIMUM SPACING: 225 SF — LOCAL HOSE THREADS: N/A — SLEEVES REQUIRED: NO
SPRINKLERS ARE REQUIRED TO BE LOCATED IN THE CENTER OF THE CEILING TILES.

■ FOREIGN — PIPE TYPES AND FITTING TYPES — ☐ DOMESTIC

LINE PIPING: SCH. 40 BLACK PIPE	LINE FITTINGS: BLACK D.I. SCREWED
MAIN PIPING: SCH. 10 BLACK PIPE	MAIN FITTINGS: STD FINISH SHORT RADIUS GRVD

■ Shop Drawings ☐ Working Drawings ☐ As-Built Drawings

This Fire Protection Drawing has been prepared by a fire sprinkler contractor (ALLIED FIRE PROTECTION, INC.) licensed in the state of North Carolina under Article 2 of Chapter 87 of the General Statutes. This drawing has been prepared for the exclusive use of Allied Fire Protection, Inc. pursuant to any and all General Statutes affected by its content. Any and all fire protection installation work expressed on or in reliance of this document by any other person or entity is strictly prohibited.
Shop drawings have been prepared in coordination with current project plans and specifications. Final pipe routing, dimensions, and elevations may be altered due to existing site conditions at the time of installation. All system modifications will be included in a final as-built set and made available to the owner at the completion of the project.

REVISIONS

No.	Description	Date	Name
1			
2			
3			
4			
5			
6			

SPRINKLER LEGEND

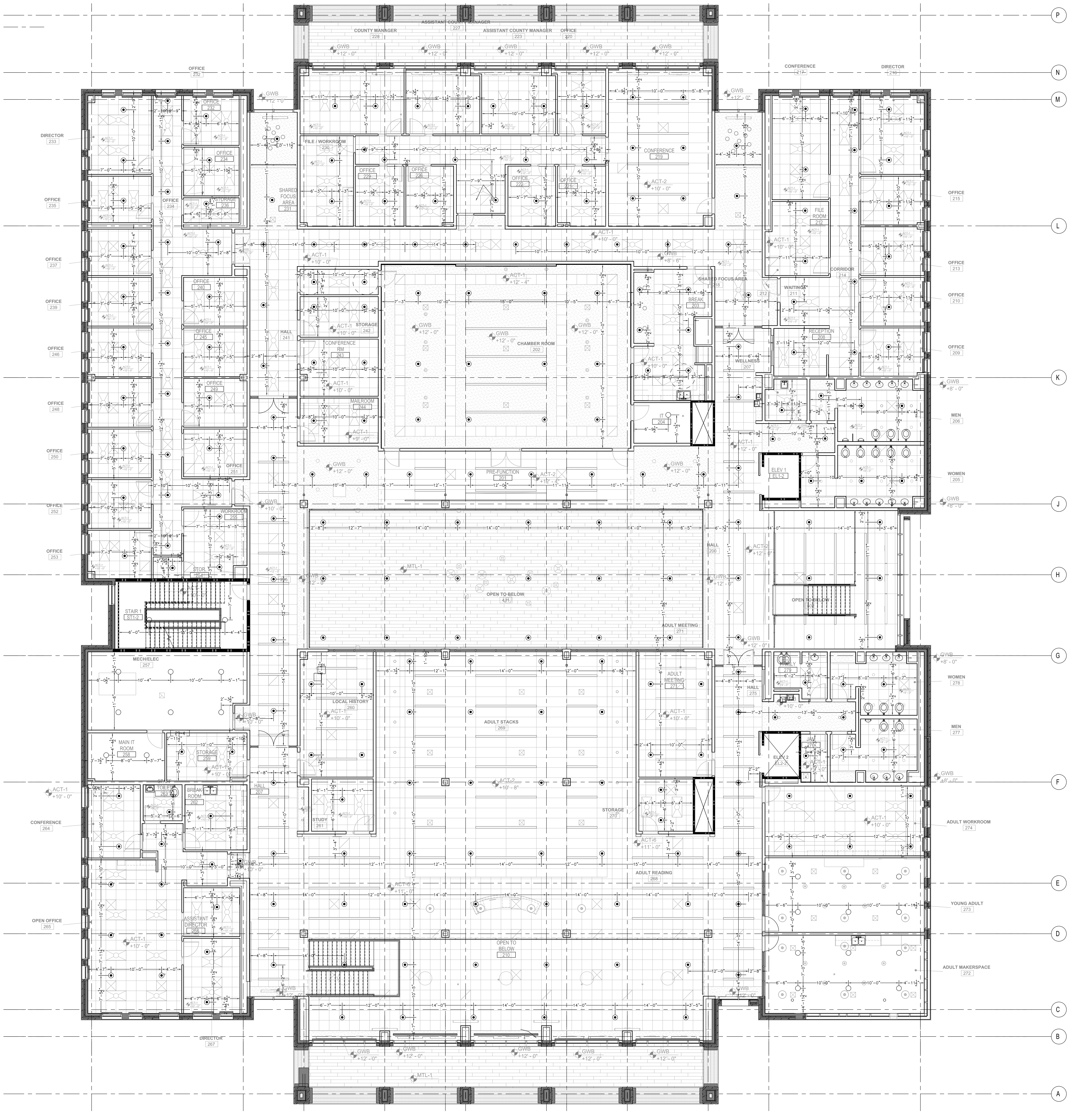
SYMBOL	MANUF.	TYPE	SIN#	FINISH	TEMP	K.FACTOR	ORIF.	NPT	TOTAL
⦿	VICTAULIC	QR-SSP	V2708	CHROME	155°	5.6	1/2	1/2	249
○	VICTAULIC	QR-SSU	V2704	BRASS	155°	5.6	1/2	1/2	19
●	GLOBE	QR-SSP CONCEAL	GL5606	WHITE CVR	155°	5.6	1/2	1/2	1
◀	GLOBE	QR-SSP-HSW	GL5626	BRASS	155°	5.6	1/2	1/2	4
⊚	VICTAULIC	DRY-QR-SSP	V3506	CHROME	155°	5.6	1/2	1	4
⊗	TYCO	TAMPER RESIST CONC PENDANT	TY3281	WHITE	155°	5.6	1/2	1/2	1
TOTAL SPRINKLERS SHOWN IN THIS AREA									278
TOTAL SPRINKLERS REQUIRED ON THIS CONTRACT									559

NORTH CAROLINA STATE LICENSE # FS 16286

LEVEL 1 PIPING PLAN
HARNETT COUNTY GSC
455 MCKINNY PKWY
LILLINGTON, NC

ALLIED FIRE PROTECTION, INC.
License: NC 16286
80 Rupert Road
Raleigh, North Carolina 27603
Phone: 919-772-9200
Fax: 919-779-4220
www.alliedfire.net

Date	DATE
Scale	1/8"=1'-0"
Job No.	203-I-19
Drawn By	MSG
Sheet No.	FP-4 OF 7



PLAN NORTH

TOTAL AREA OF PROTECTION ± 61,900 SQ.FT.

LEVEL 2 RCP PLAN

1/8" = 1'-0"

GRAPHIC SCALE: 1/8" = 1'- 0"

NICET CERTIFIED
ALEX CHERRY Jr. - C.E.T.
LEVEL III CERTIFICATION #109758
WATER-BASED SYSTEMS LAYOUT

APPROVING AGENCIES

APPROVING AUTHORITY: HARNETT COUNTY
UNDERWRITER:
GENERAL CONTRACTOR: BALFOUR BEATTY CONST
ADDRESS: 406 MACDOWELL ST
CITY & STATE: RALEIGH, NC 27601
PHONE NO.: 919-233-5001
FAX NO.:

SYSTEM DESIGN CRITERIA

TYPE SYSTEM: ■ WET ☐ DRY ☐ DELUGE ☐ PREACTION ☐ ANTI-FREEZE
NFPA STANDARD: ■ #13 ☐ #13D ☐ #13R ☐ #14 ☐ #20 ☐ #22 ☐ #24 ☐ #231 ☐ #231C ☐ #15 ☐ #16 ☐ #409
OCCUPANCY: OFFICE/LIBRARY HAZARD: LIGHT PIPE ID REQUIRED: NO
MAXIMUM SPACING: 225 SF LOCAL HOSE THREADS: N/A SLEEVES REQUIRED: NO
SPRINKLERS ARE REQUIRED TO BE LOCATED IN THE CENTER OF THE CEILING TILES.

PIPE TYPES AND FITTING TYPES

■ FOREIGN ☐ DOMESTIC
LINE PIPING: SCH. 40 BLACK PIPE — LINE FITTINGS: BLACK D.I. SCREWED
MAIN PIPING: SCH. 10 BLACK PIPE — MAIN FITTINGS: STD FINISH SHORT RADIUS GRVD

■ Shop Drawings ☐ Working Drawings ☐ As-Built Drawings

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REVISIONS

No.	Description	Date	Name
1			
2			
3			
4			
5			
6			

SPRINKLER LEGEND

SYMBOL	MANUF.	TYPE	SIN#	FINISH	TEMP	K.FACTOR	ORIF.	NPT	TOTAL
⦿	VICTAULIC	QR-SSP	V2708	CHROME	155°	5.6	1/2	1/2	258
○	VICTAULIC	QR-SSU	V2704	BRASS	155°	5.6	1/2	1/2	23
●	GLOBE	QR-SSP CONCEAL	GL5606	WHITE CVR	155°	5.6	1/2	1/2	--
▼	GLOBE	QR-SSP-HSW	GL5626	BRASS	155°	5.6	1/2	1/2	--
◬	VICTAULIC	DRY-QR-SSP	V3506	CHROME	155°	5.6	1/2	1	--
⊠	TYCO	TAMPER RESIST CONC PENDANT	TY3281	WHITE	155°	5.6	1/2	1/2	--
TOTAL SPRINKLERS SHOWN IN THIS AREA									281
TOTAL SPRINKLERS REQUIRED ON THIS CONTRACT									559

ALLIED fire protection INC.
ALLIED FIRE PROTECTION, INC.
License: NC 16286
80 Rupert Road
Raleigh, North Carolina 27603
Phone: 919-772-9200
Fax: 919-779-4220
www.alliedfire.net

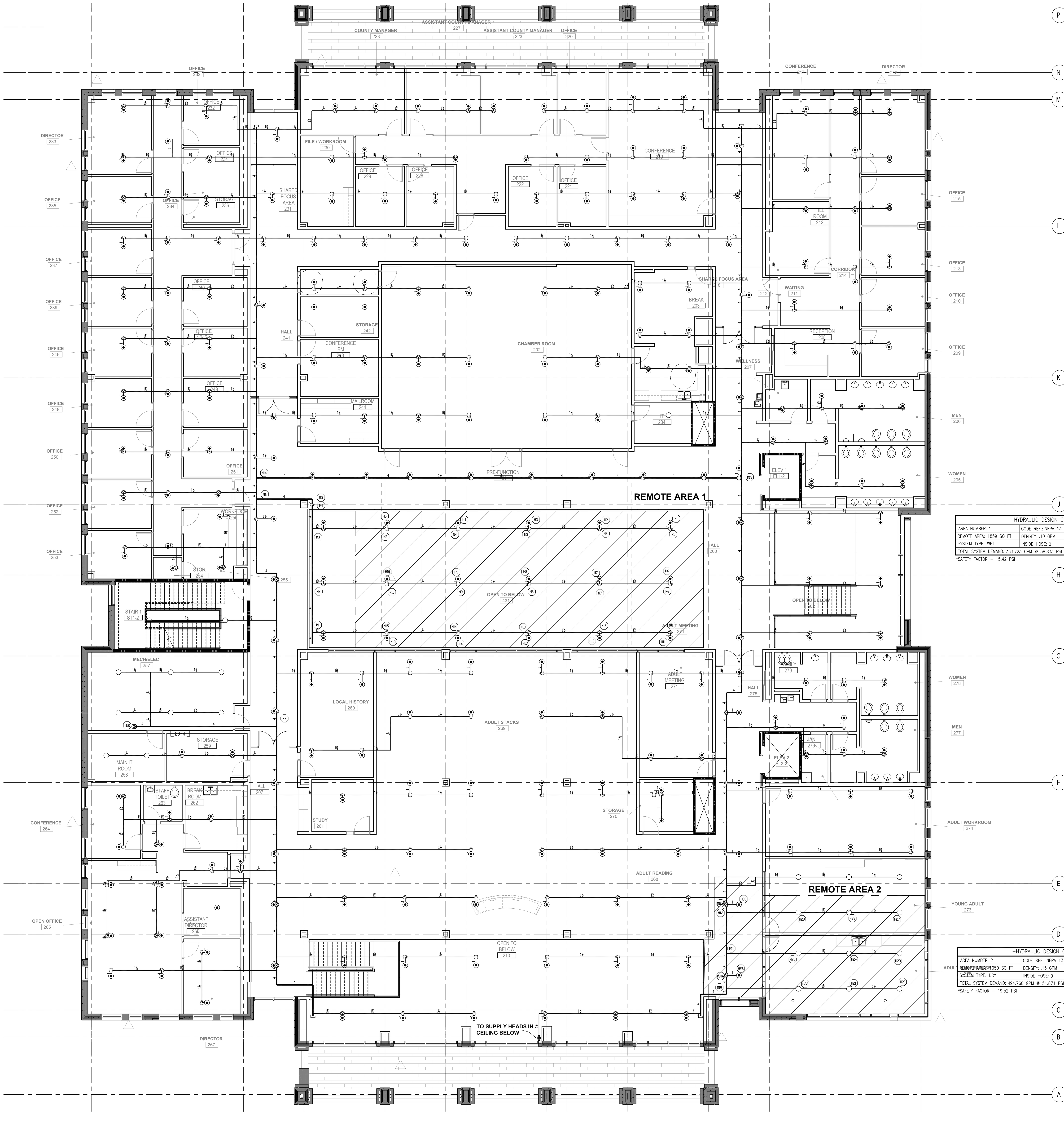
NORTH CAROLINA STATE LICENSE # FS 16286

LEVEL 2 REFLECTED CEILING PLAN

HARNETT COUNTY GSC

455 MCKINNY PKWY
LILLINGTON, NC

Date	DATE
Scale	1/8"=1'-0"
Job No.	203-I-19
Drawn By	MSG
Sheet No.	FP-5 OF 7



-HYDRAULIC DESIGN CRITERIA-		
AREA NUMBER: 1	CODE REF.: NFPA 13	HAZARD: LIGHT HAZARD
REMOTE AREA: 1859 SQ FT	DENSITY: .10 GPM	AREA PER SPRINKLER: 168 SQ. FT.
SYSTEM TYPE: WET	INSIDE HOSE: 0	OUTSIDE HOSE: 100 GPM
TOTAL SYSTEM DEMAND: 363.723 GPM @ 58.833 PSI AT TEST		

*SAFETY FACTOR – 15.42 PSI

-HYDRAULIC DESIGN CRITERIA-		
AREA NUMBER: 2	CODE REF.: NFPA 13	HAZARD: ORDINARY GRP 1 HAZARD
REMOTE AREA: 1050 SQ FT	DENSITY: .15 GPM	AREA PER SPRINKLER: 130 SQ. FT.
SYSTEM TYPE: DRY	INSIDE HOSE: 0	OUTSIDE HOSE: 250 GPM
TOTAL SYSTEM DEMAND: 494.760 GPM @ 51.871 PSI AT TEST		

*SAFETY FACTOR – 19.52 PSI

PLAN NORTH

TOTAL AREA OF PROTECTION ± 61,900 SQ.FT.

LEVEL 2 PIPING PLAN

1/8" = 1'-0"

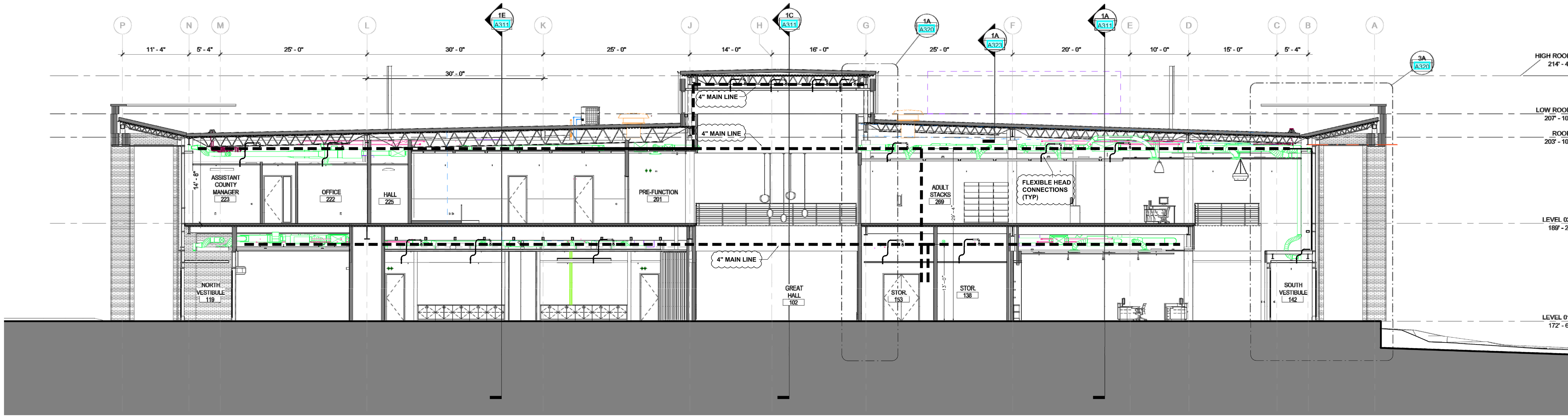
GRAPHIC SCALE: 1/8" = 1'- 0"

NICET CERTIFIED
ALEX CHERRY Jr. - C.E.T.
LEVEL III CERTIFICATION #109758
WATER-BASED SYSTEMS LAYOUT

LEVEL 2 PIPING PLAN
HARNETT COUNTY GSC
455 MCKINNEY PKWY
LILLINGTON, NC

ALLIED FIRE PROTECTION, INC.
License: NC 16286
Raleigh, North Carolina 27603
Phone: 919-779-8200
Fax: 919-779-4220
www.alliedfire.net

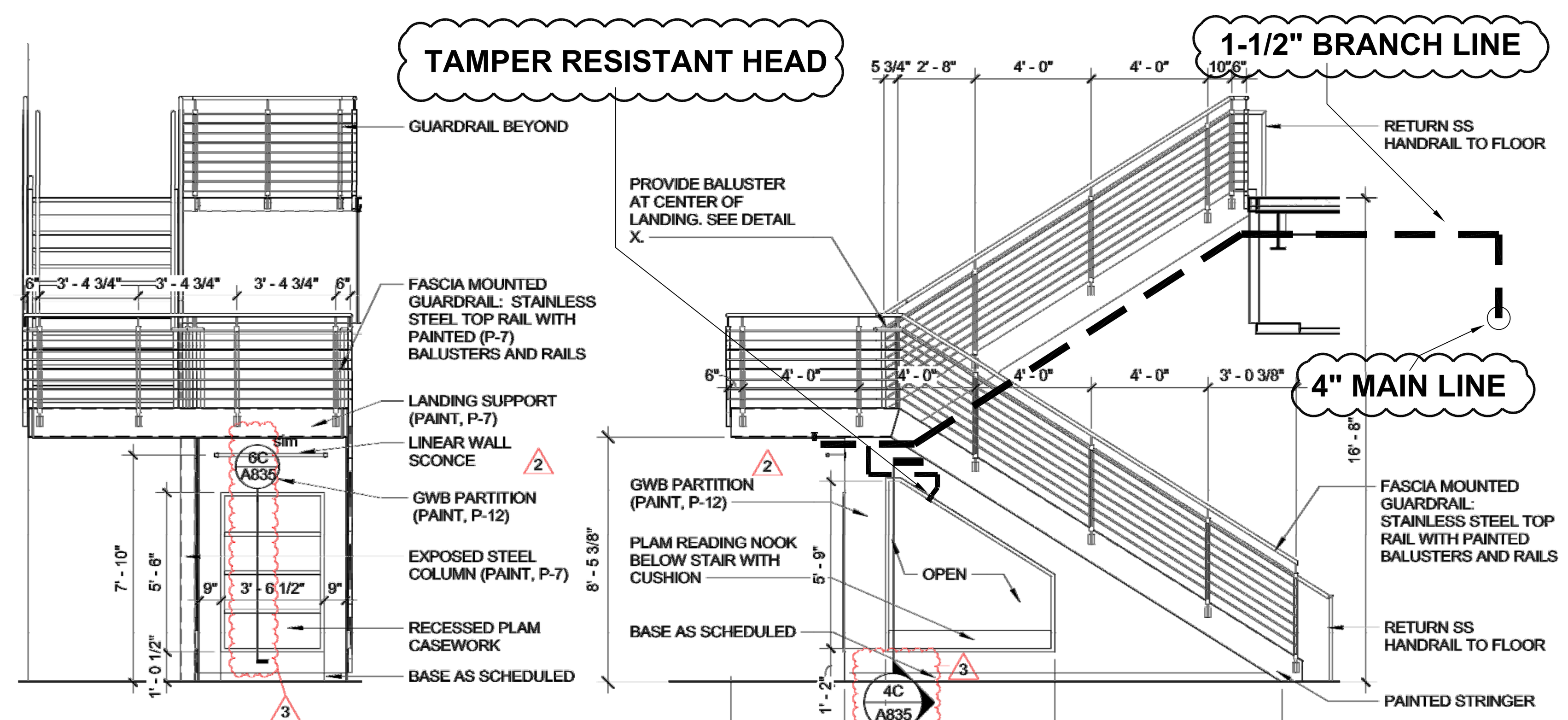
Sheet No. FP-6 OF 7



PLAN EAST ELEVATION

1/8" = 1'-0"

GRAPHIC SCALE: 1/8" = 1'- 0"



LOBBY STAIR DETAIL

1/4" = 1'-0"

GRAPHIC SCALE: 1/4" = 1'- 0"

PLAN NORTH

NICET CERTIFIED
ALEX CHERRY Jr. - C.E.T.
LEVEL III CERTIFICATION #109758
WATER-BASED SYSTEMS LAYOUT

NORTH CAROLINA STATE LICENSE # FS 16286

BUILDING ELEVATIONS

HARNETT COUNTY GSC
455 MCKINNEY PKWY
LILLINGTON, NC

ALLIED FIRE PROTECTION, INC.
License: NC 16286
Raleigh, North Carolina 27603
Phone: 919-772-8200
Fax: 919-779-4220
www.alliedfire.net

Date | Scale 1/8"=1'-0" | Job No. 2023-119 | Drawn By MSG | Sheet No. FP-7 OF 7

SPRINKLER LEGEND

SYMBOL	MANUF.	TYPE	SIN#	FINISH	TEMP	K FACTOR	ORIF.	NPT	TOTAL
	VICTAULIC	QR-SSP	V2708	CHROME	155°	5.6	1/2	1/2	258
	VICTAULIC	QR-SSU	V2704	BRASS	155°	5.6	1/2	1/2	23
	GLOBE	QR-SSP CONCEAL	GL5606	WHITE CVR	155°	5.6	1/2	1/2	-
	GLOBE	QR-SSP-HSW	GL5626	BRASS	155°	5.6	1/2	1/2	-
	VICTAULIC	DRY-QR-SSP	V3506	CHROME	155°	5.6	1/2	1	-
	TYCO		TY3281	WHITE	155°	5.6	1/2	1/2	-
TOTAL SPRINKLERS SHOWN IN THIS AREA									281
TOTAL SPRINKLERS REQUIRED ON THIS CONTRACT									559

REVISIONS

No.	Description	Date	Name
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Shop Drawings / Working Drawings / As-Built Drawings

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NFPA STANDARD: #13 / #13D / #13R / #14 / #20 / #22 / #24 / #231 / #231C / #15 / #16 / #409
OCCUPANCY: OFFICE / LIBRARY — HAZARD: LIGHT — PIPE ID REQUIRED: NO
MAXIMUM SPACING: 225 SF — LOCAL HOSE THREADS: N/A — SLEEVES REQUIRED: NO
SPRINKLERS ARE REQUIRED TO BE LOCATED IN THE CENTER OF THE CEILING TILES.

PIPE TYPES AND FITTING TYPES
FOREIGN / DOMESTIC
LINE PIPING: SCH. 40 BLACK PIPE — LINE FITTINGS: BLACK D.I. SCREWED
MAIN PIPING: SCH. 10 BLACK PIPE — MAIN FITTINGS: STD FINISH SHORT RADIUS GRVD

APPROVING AGENCIES
APPROVING AUTHORITY: HARNETT COUNTY
UNDERWRITER:
GENERAL CONTRACTOR: BALFOUR BEATTY CONST
ADDRESS: 408 MACDOWELL ST
CITY & STATE: RALEIGH, NC 27601
PHONE NO.: 919-233-0001
FAX NO.: