PATRIOT FIRE PROTECTION, INC.

Fire Sprinklers Save Lives!

City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

2707 70TH Avenue East
Tacoma, WA 98424

TEL: (253) 926.2290
FAX: (253) 922.6150

PUYALLUP POLICE DEPT.

Equipment Submittal

1015 39th Avenue SE
Puyallup, WA 98374

Patriot Project No. 11-2510

Submitted To:

Expires DEC 31, 24

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE SPRINKLER SYSTEMS

Clint Edward Carr
8765-1209-C Level 3
Patriot Fire Protection, Inc.
PATRIFP099CF

07/10/2025

Signature Date

General Contractor

JTM Construction

HANFORD, WA OFFICE
TEL (509) 373.8895
FAX (509) 373.8919

VANCOUVER, WA OFFICE
TEL (360) 699.4403
PORTLAND (503) 222.6001
FAX (360) 699.4485

SPOKANE, WA OFFICE
TEL (509) 926.3428
FAX (509) 926.3708

PATRIFP099CF

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PIPING

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State Pipe & Supply, Inc.

THIS INFORMATION PROVIDED IS BASED ON ASTM GUIDELINES FOR WELDED PIPE SPECIFICATIONS AND ASTM REQUIREMENTS. ACTUAL PIPE AND MATERIAL TEST REPORTS PROVIDED WOULD MEET OR EXCEED THESE GUIDELINES.

TEST REPORTS WOULD PROVIDE SPECIFIC AND ACTUAL DETAILS CONCERNING THE MECHANICAL AND CHEMICAL PROPERTIES OF THE ACTUAL PIPE, AS WELL AS ADDITIONAL TESTS RESULTS REQUIRED BY ASTM.

SCHEDULE 10 ** Black and Galvanized Steel ERW Pipe

Pipe Size Nominal	O.D.	I.D.	Weight / Foot	Test Pressure psi
1"	1.315	1.097	1.410	700
1-1/4"	1.660	1.442	1.810	1200
1-1/2"	1.900	1.682	2.090	1200
2"	2.375	2.157	2.640	2300
2-1/2"	2.875	2.635	3.530	2500
3"	3.500	3.260	4.340	1290
4"	4.500	4.260	5.620	1000
5"	5.563	5.295	7.780	1010
6"	6.625	6.357	9.300	1020
8" **	8.625	8.249	16.960	780

** 8" wall thickness is 0.188, not SCH10 or 0.148" wall thickness.

COMPOSITION AND PROPERTIES

Chemical and mechanical properties requirements are as prescribed by applicable ASTM standards edition January 2006.

Chemical Requirements, Percent (Product)

		C	Mn	P	S	Other
Specification	Grade	max	max	max	max	
ASTM A53	A	0.250	0.950	0.05	0.045	-

1 Residual elements max: Cu-0.40, Ni-0.40, Cr-0.40, Mo-0.15 and V-.08. These live elements combined shall not exceed 1%.

Mechanical Properties-Tensile Requirements

		Strength-psi.			
		Yield		Tensile	
Specification	Grade	Min	Max	Min	Max
ASTM A53	A	30,000	-	48,000	-

NOTE: Elongation requirements vary with nominal area of test specimen and specified minimum tensile strength of the steel grade.

State Pipe & Supply, Inc.

THIS INFORMATION PROVIDED IS BASED ON ASTM GUIDELINES FOR WELDED PIPE SPECIFICATIONS AND ASTM REQUIREMENTS. ACTUAL PIPE AND MATERIAL TEST REPORTS PROVIDED WOULD MEET OR EXCEED THESE GUIDELINES.

TEST REPORTS WOULD PROVIDE SPECIFIC AND ACTUAL DETAILS CONCERNING THE MECHANICAL AND CHEMICAL PROPERTIES OF THE ACTUAL PIPE, AS WELL AS ADDITIONAL TESTS RESULTS REQUIRED BY ASTM.

SCHEDULE 40 Black and Galvanized Steel ERW Pipe

Pipe Size Nominal	O.D.	I.D.	Weight / Foot	Test Pressure psi
1"	1.315	1.049	1.680	700
1-1/4"	1.660	1.380	2.270	1200
1-1/2"	1.900	1.610	2.720	1200
2"	2.375	2.067	3.660	2300
2-1/2"	2.875	2.469	5.800	2500
3"	3.500	3.068	7.580	2220
4"	4.500	4.026	10.800	1900
5"	5.563	5.047	14.630	1670
6"	6.625	6.065	18.990	1520
8"	8.625	7.981	28.580	1340

COMPOSITION AND PROPERTIES

Chemical and mechanical properties requirements are as prescribed by applicable ASTM standards edition January 2006.

Chemical Requirements, Percent (Product)

		C	Mn	P	S	Other
Specification	Grade	max	max	max	max	
ASTM A53	A	0.250	0.950	0.05	0.045	-

1 Residual elements max: Cu-0.40, Ni-0.40, Cr-0.40, Mo-0.15 and V-.08. These five elements combined shall not exceed 1%.

Mechanical Properties-Tensile Requirements

		Strength-psi.			
		Yield		Tensile	
Specification	Grade	Min	Max	Min	Max
ASTM A53	A	30,000	-	48,000	-

NOTE: Elongation requirements vary with nominal area of test specimen and specified minimum tensile strength of the steel grade.

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FITTINGS / COUPLINGS

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SPOKANE, WA OFFICE
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FAX (509) 926.3708

FireLock™ Fittings

1.0 PRODUCT DESCRIPTION

Available Sizes

- 1 ¼ – 12"/DN32 – DN300

Maximum Working Pressure

- Pressure ratings for Victaulic FireLock™ Fittings conform to the ratings of Victaulic FireLock Installation-Ready™ Style 009N couplings (refer to publication 10.64 for more information).

Application

- FireLock™ fittings are designed for use exclusively with Victaulic couplings that have been Listed or Approved for Fire Protection Services. Use of other couplings or flange adapters may result in bolt pad interference.
- Connects pipe, provides change in direction and adapts sizes or components

Pipe Materials

- Carbon steel

2.0 CERTIFICATION/LISTINGS

EN 10311
CPR (EU)
No. 305/2011

BS EN 10311
CPR (UK)
2019 No. 465

3.0 SPECIFICATIONS – MATERIAL

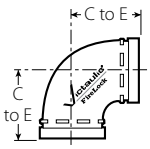
Fitting: Ductile iron conforming to ASTM A536, Grade 65-45-12.

Fitting Coating: (specify choice)

- ☐ Orange coating.
- ☐ Red coating (standard for EMEA-I and Asia Pacific).
- ☐ Optional: Hot dipped galvanized.

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

4.0 DIMENSIONS



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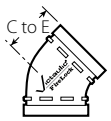

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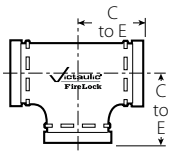


No. 002

No. 006

Nominal Size inches DN	Actual Outside Diameter inches mm	No. 001 90° Elbow C to E inches mm	No. 001 90° Elbow Approximate Weight Each lb kg	No. 003 45° Elbow C to E inches mm	No. 003 45° Elbow Approximate Weight Each lb kg	No. 002 Straight Tee C to E inches mm	No. 002 Straight Tee Approximate Weight Each lb kg	No. 006 Cap T inches mm	No. 006 Cap Approximate Weight Each lb kg
1 ¼ DN32	1.660 42.4	2.75 70	1.0 0.5	1.75 45	0.7 0.3	2.75 70	1.4 0.6	0.82 21	0.3 0.1
1 ½ DN40	1.900 48.3	2.75 70	1.2 0.5	1.75 45	0.8 0.4	2.75 70	1.8 0.8	0.82 21	0.4 0.2
2 DN50	2.375 60.3	2.75 70	1.6 0.7	2.00 51	1.4 0.6	2.75 70	2.4 1.1	0.88 22	0.6 0.3
2 ½	2.875 73.0	3.00 76	2.1 1.0	2.25 57	2.2 1.0	3.00 76	3.4 1.5	0.88 22	1.0 0.5
 DN65	3.000 76.1	3.00 76	2.5 1.1	2.25 57	2.4 1.1	3.00 76	3.8 1.7	–	–
3 DN80	3.500 88.9	3.38 86	3.4 1.5	2.50 64	3.1 1.4	3.38 86	5.1 2.3	0.88 22	1.2 0.5
	4.250 108.0	4.00 102	5.7 2.6	3.00 76	5.1 2.3	4.00 102	7.5 3.4	–	–
4 DN100	4.500 114.3	4.00 102	5.9 2.7	3.00 76	4.9 2.2	4.00 102	6.8 3.1	1.00 25	2.4 1.1
 DN125	5.500 139.7	4.88 124	12.4 5.6	3.25 83	8.2 3.7	4.88 124	15.4 7.0	–	–
5	5.563 141.3	4.88 124	7.8 3.5	3.25 83	8.3 3.8	4.88 124	15.3 6.9	1.00 25	4.1 1.9
	6.250 159.0	5.50 140	12.6 5.7	3.50 89	9.2 4.2	5.50 140	17.9 8.1	–	–
	6.500 165.1	5.43 138	13.0 5.9	3.50 89	9.4 4.2	5.50 140	19.7 8.9	–	–
6 DN150	6.625 168.3	5.50 140	13.7 6.2	3.50 89	10.4 4.7	5.50 140	20.2 9.2	1.00 25	5.9 2.7
	8.515 216.3	6.81 173	23.1 10.5	–	–	6.94 176	33.6 15.0	–	–
8 DN200	8.625 219.1	6.81 173	25.4 11.5	4.25 108	18.9 8.6	6.94 176	36.9 16.8	1.13 29	12.7 5.8
10 DN250	10.750 273.0	8.25 210	43.2 19.6	4.00 102	25.0 11.3	8.25 210	63.6 28.9	1.06 27	14.2 6.4
12 DN300	12.750 323.9	9.38 238	66.7 30.3	4.50 114	36.1 16.4	9.38 238	80.7 36.6	1.06 27	22.6 10.3

5.0 PERFORMANCE

Flow Data

Size		Flow Data Frictional Resistance			
Nominal inches DN	**Actual Outside Diameter** inches mm	**No. 001 90° Elbow** feet meters	**No. 003 45° Elbow** feet meters	**No. 002 Straight Tee Branch** feet meters	**No. 002 Straight Tee Run** feet meters
1 ¼ DN32	1.660 42.4	2.00 0.6	2.13 0.6	7.50 2.3	0.50 0.2
1 ½ DN40	1.900 48.3	2.63 0.8	2.75 0.8	6.63 2.0	1.00 0.3
2 DN50	2.375 60.3	3.50 1.1	1.88 0.6	8.50 2.6	3.50 1.1
2 ½	2.875 73.0	4.38 1.3	2.25 0.7	10.88 3.3	4.38 1.3
DN65	3.000 76.1	4.50 1.4	2.38 0.7	11.00 3.4	4.50 1.4
3 DN80	3.500 88.9	5.00 1.5	2.63 0.8	13.00 4.0	5.00 1.5
	4.250 108.0	6.50 2.0	3.25 1.0	15.38 4.7	6.50 2.0
4 DN100	4.500 114.3	6.88 2.1	3.50 1.1	16.00 4.9	6.88 2.1
DN125	5.500 139.7	8.38 2.6	4.13 1.3	20.63 6.3	8.38 2.6
5	5.563 141.3	8.50 2.6	4.25 1.3	21.00 6.4	8.50 2.6
	6.250 159.0	9.50 2.9	5.00 1.5	25.00 7.6	9.63 2.9
	6.500 165.1	9.88 3.0	5.00 1.5	24.50 7.5	9.88 3.0
6 DN150	6.625 168.3	10.00 3.0	5.00 1.5	25.00 7.6	10.00 3.0
216 DN200	8.515 216.3	13.00 4.0	-	33.00 10.1	13.00 4.0
8 DN200	8.625 219.1	13.00 4.0	6.50 2.0	33.00 12.5	13.00 5.2
10 DN250	10.750 273.0	17.00 5.2	8.30 2.50	41.00 12.5	17.00 5.2
12 DN300	12.750 323.9	20.00 6.1	10.00 3.0	50.00 15.2	20.00 6.1

[1] The flow data listed is based upon the pressure drop of Schedule 40 pipe.

6.0 NOTIFICATIONS

General Notes

NOTE: When assembling FireLock EZ™ couplings onto end caps, take additional care to make certain the end cap is fully seated against the gasket end stop. For FireLock EZ™ Style 009N/009H couplings, use FireLock™ No. 006 end caps containing the “EZ” marking on the inside face or No. 60 end caps containing the “QV EZ” marking on the inside face. Non-Victaulic end cap products shall not be used with Style 009/009V/009H/009N couplings.

7.0 REFERENCE MATERIALS

10.64: Victaulic® FireLock™ Rigid Coupling Style 009N

10.02: Victaulic® FireLock™ Rigid Coupling Style 005H with Vic-Plus™ Gasket System

29.01: Victaulic® Terms and Conditions of Sale

Victaulic® Grooved End Fittings

No. 20 Tee

No. 10 Elbow

1.0 PRODUCT DESCRIPTION

Available Sizes

- ¾ – 60"/DN20 – DN1500

Maximum Working Pressure

- Pressure ratings for Victaulic standard fittings conform to the ratings of Victaulic Style 177N couplings (refer to publication 06.24 for more information).

Application

- Connects pipe, provides change in direction and adapts sizes or components
- Supplied with Victaulic OGS grooves
- Exclusively for use with Victaulic couplings, valves, accessories and pipe which feature ends formed with the Victaulic OGS groove profile

Pipe Materials

- Carbon steel or stainless steel

NOTE

- These fittings are not intended for use with Victaulic plain end couplings. Intended for use only in grooved piping systems. When connecting wafer or lug type butterfly valves directly to Victaulic fittings using Style 741 or Style 743 flange adapters, be sure to check disc clearance dimensions with I.D. dimension of fitting.

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	

1.0 PRODUCT DESCRIPTION (Continued)

Other Fitting Styles

AGS - Advanced Groove System
from 14 – 60"/DN350 – DN1500
Publication 20.05

Stainless Steel
Publication 17.16

Galvanized
Publication 07.01 for Original Groove Fittings
Publication 20.05 for AGS Fittings

Extra Heavy EndSeal “ES”
Publication 07.03

Copper
Publication 22.04

Ductile Iron for AWWA size pipe
Publication 23.05

XL fittings for abrasive services
Publication 07.07

Aluminum
Publication 21.03

Shouldered Ends
Publication 07.06

Plain End
Publication 14.04

2.0 CERTIFICATION/LISTINGS

NOTES

- When supplied as “hot dip galvanized” the following fittings are UL Classified in accordance with ANSI/NSF 61 and for use on cold +86°F/+30°C potable water service and ANSI/NSF 372: No. 10 90° Elbow, No. 11 45° Elbow, No. 12 22½° Elbow, No. 13 11¼° Elbow, No. 100 90° Long Radius Elbow, No. 110 45° Long Radius Elbow, No. 20 Tee, No. 25 Tee with Grooved Branch, No. 30 45° Lateral, No. 60 Cap, No. 50 Concentric Reducers, No. 51 Eccentric Reducers.
- The following Victaulic fittings are VdS approved: No.10 90° Elbow, No.11 45° Elbow, No.20 Tee and No.60 Cap.
- The following Victaulic fittings are LPCB approved: No.10 90° Elbow, No.11 45° Elbow, No.12 22 ½ Elbow, No.13 11 ¼° Elbow, No.30 45° Lateral, No.30-R Reducing Lateral, No.100 Long Radius Elbow, No.110 Long Radius Elbow, No.20 Tee, No.35 Cross, No.60 Cap, No.25 Reducing Tee, No.33 True Wye, No.50 Concentric Reducer, No.51 Eccentric Reducer and No.29M Tee with Threaded Branch.
- The following Victaulic fittings are FM approved: No.10 90° Elbow, No.11 45° Elbow, No.12 22½ Elbow, No.13 11¼° Elbow, No.30 45° Lateral, No.100 Long Radius Elbow, No.20 Tee, No.35 Cross, No.60 Cap, No.25 Reducing Tee and No.50 Concentric Reducer.

3.0 SPECIFICATIONS - MATERIAL

Fitting: (specify choice)

- ☐ Standard: Ductile iron conforming to ASTM A536, Grade 65-45-12.
- ☐ Optional: Segmentally welded steel as shown under nipples

Nipples: (specify choice)

- ☐ ¾ – 4"/DN20 – DN100: Carbon steel, Schedule 40, conforming to ASTM A53, Type F
- ☐ 5 – 6"/DN125 – DN150: Carbon steel, Schedule 40, conforming to ASTM A53, Type E or S, Gr. B
- ☐ 8 – 12"/DN200 – DN300: Carbon steel, Schedule 30 or 40, conforming to ASTM A53, Type E or S, Gr. B

Flanged Adapter Nipples: (specify choice)

- ☐ Class 125 Flange: Cast iron conforming to ANSI B16.1
- ☐ Class 150 Flange: Carbon steel conforming to ANSI B16.5, raised or flat face
- ☐ Class 300 Flange: Carbon steel conforming to ANSI B16.5, raised or flat face

Fitting Coating: (specify choice)

- ☐ Standard: Orange enamel
- ☐ Optional: Hot dip galvanized and others. Some fittings supplied electroplated as standard – see product specifications

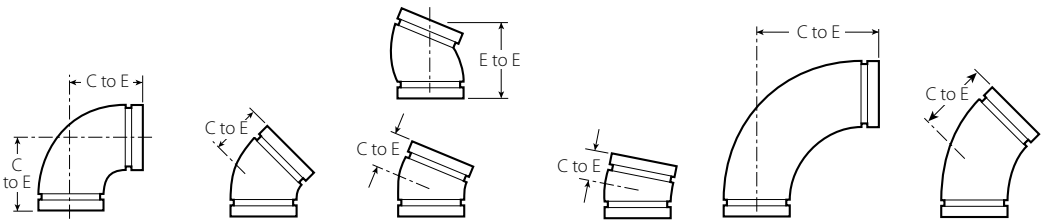
Flanged Adapter Nipple Coating: (specify choice)

- ☐ Standard: None (Unfinished)
- ☐ Optional: Orange enamel, hot dip galvanized and others

4.0 DIMENSIONS

Elbows

No. 10 90° Elbow
No. 11 45° Elbow
No. 12 22½° Elbow
No. 13 11¼° Elbow
No. 100 90° Long Radius Elbow
No. 110 45° Long Radius Elbow



Standard and GSNK

Size		No. 10 90° Elbow		No. 11 45° Elbow		No. 12 22½° Elbow		No. 13 11¼° Elbow		No. 100 90° Long Radius Elbow		No. 110 45° Long Radius Elbow	
Nominal inches DN	Actual Outside Diameter inches mm	C to E inches mm	Approx. Wgt. (Each) lb kg	C to E inches mm	Approx. Wgt. (Each) lb kg	C to E inches mm	Approx. Wgt. (Each) lb kg	C to E inches mm	Approx. Wgt. (Each) lb kg	C to E inches mm	Approx. Wgt. (Each) lb kg	C to E inches mm	Approx. Wgt. (Each) lb kg
¾ DN20	1.050 26.9	2.25 57	0.5 0.2	1.50 38	0.5 0.2	1.63 (sw) 41	—	1.38 (sw) 35	—	2.50 (sw) 64	0.4 0.2	1.88 (sw) 48	0.3 0.1
1 DN25	1.315 33.7	2.25 57	0.6 0.3	1.75 44	0.6 0.3	3.25[1] 83	0.6 0.3	1.38 (sw) 35	0.3 0.1	2.88 (sw) 73	0.6 0.3	2.25 (sw) 57	0.5 0.2
1 ¼ DN32	1.660 42.4	2.75 70	1.0 0.5	1.75 44	0.9 0.4	1.75 44	0.8 0.4	1.38 (sw) 35	0.5 0.2	3.25 (sw) 83	1.1 0.5	2.38 (sw) 60	0.7 0.3
1 ½ DN40	1.900 48.3	2.75 70	1.2 0.5	1.75 44	0.9 0.4	1.75 44	0.8 0.4	1.38 (sw) 35	0.5 0.2	3.63 (sw) 92	2.2 1.0	2.50 (sw) 64	1.3 0.6
2 DN50	2.375 60.3	3.25 83	1.8 0.8	2.00 51	1.3 0.6	1.88 48	1.2 0.5	1.38 35	1.0 0.5	4.38 111	2.5 1.1	2.75 70	1.8 0.8
2 ½	2.875 73.0	3.75 95	3.2 1.5	2.25 57	2.2 1.0	4.00[1] 102	2.3 1.0	1.50 38	1.1 0.5	5.13 130	3.4 1.5	3.00 76	2.8 1.3
DN65	3.000 76.1	3.75 95	3.7 1.7	2.25 57	3.4 1.5	2.25 57	—	1.50 38	—	—	—	—	—
3 DN80	3.500 88.9	4.25 108	4.5 2.0	2.50 64	3.1 1.4	4.50[1] 114	3.1 1.4	1.50 38	2.1 1.0	5.88 149	6.0 2.7	3.38 86	4.9 2.2
3 ½ DN90	4.000 101.6	4.50 114	5.6 2.5	2.75 70	4.3 2.0	2.50 (sw) 64	4.0 1.8	1.75 (sw) 44	2.7 1.2	—	—	—	—
4 DN100	4.500 114.3	5.00 127	7.1 3.2	3.00 76	5.6 2.5	2.88 73	5.6 2.5	1.75 44	3.6 1.6	7.50 191	12.3 5.6	4.00 102	7.3 3.3
	4.250 108.0	5.00 127	11.0 5.0	3.00 76	5.6 2.5	—	—	—	—	—	—	—	—
	5.000 127.0	5.25 (sw) 133	10.0 4.5	3.13 (sw) 79	6.0 2.7	3.50 (sw) 89	6.6 3.0	1.88 (sw) 48	4.2 1.9	—	—	—	—
5	5.563 141.3	5.50 140	11.7 5.3	3.25 83	8.3 3.8	2.88 (sw) 73	7.8 3.5	2.00 (sw) 51	5.0 2.2	9.25 (sw) 235	18.0 8.2	4.88 (sw) 124	14.8 6.7
	5.250 133.0	5.50 140	11.7 5.3	3.25 83	8.3 3.8	—	—	—	—	—	—	—	—
DN125	5.500 139.7	5.50 140	11.7 5.3	3.25 83	8.3 3.8	2.88 73	—	2.00 51	—	—	—	—	—
6 DN150	6.625 168.3	6.50 165	17.2 7.8	3.50 89	10.8 4.9	6.25[1] 159	12.2 5.5	2.00 51	7.0 3.2	10.75 273	30.4 13.8	5.50 140	17.4 7.9
	6.250 159.0	6.50 165	18.6 8.4	3.50 89	10.8 4.9	—	—	—	—	—	—	—	—
	6.500 165.1	6.50 165	15.5 7.0	3.50 89	9.8 4.4	3.13 79	11.4 5.2	2.00 51	7.4 3.4	10.75 (sw) 273	29.0 13.2	5.50 (sw) 140	19.0 8.6

[1] Gooseneck design, end-to-end dimension fittings in this size, contact your nearest Victaulic sales representative.

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

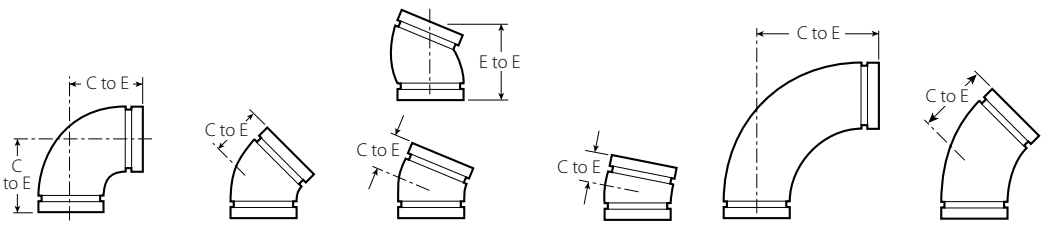
NOTE

- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

4.0 DIMENSIONS (Continued)

Elbows

No. 10 90° Elbow
No. 11 45° Elbow
No. 12 22½° Elbow
No. 13 11¼° Elbow
No. 100 90° Long Radius Elbow
No. 110 45° Long Radius Elbow



Standard and GSNK

Size		No. 10 90° Elbow		No. 11 45° Elbow		No. 12 22½° Elbow		No. 13 11¼° Elbow		No. 100 90° Long Radius Elbow		No. 110 45° Long Radius Elbow	
Nominal inches DN	Actual Outside Diameter inches mm	C to E inches mm	Approx. Wgt. (Each) lb kg	C to E inches mm	Approx. Wgt. (Each) lb kg	C to E inches mm	Approx. Wgt. Each lb kg	C to E inches mm	Approx. Wgt. (Each) lb kg	C to E inches mm	Approx. Wgt. (Each) lb kg	C to E inches mm	Approx. Wgt. (Each) lb kg
8 DN200	8.625 219.1	7.75 197	29.9 13.6	4.25 108	20.4 9.3	7.75[1] 197	20.0 9.1	2.00 51	10.1 4.6	14.25 362	66.0 30.0	7.25 184	36.0 16.3
10 DN250	10.750 273.0	9.00 229	63.3 28.7	4.75 121	37.5 17.0	4.38 (sw) 111	30.0 13.6	2.13 54	11.8 5.3	15.00 381	107.0 48.5	6.25 159	57.0 25.9
12 DN300	12.750 323.9	10.00 254	74.0 33.6	5.25 133	66.7 30.3	4.88 (sw) 124	40.0 18.1	2.25 57	29.3 13.3	18.00 457	156.0 70.8	7.50 191	90.0 40.8
14[2] DN350	14.000 355.6	14.00 356	136.0 61.7	5.75 146	65.0 29.5	5.00 (sw) 127	46.0 20.9	3.50 (sw) 89	32.0 14.5	21.00 (s) 533	164.0 74.4	8.75 222	82.0 37.2
	14.843 377.0	14.84 377	149.3 67.7	6.13 156	82.0 37.2	—	—	—	—	—	—	—	—
16[2] DN400	16.000 406.5	16.00 406	171.0 77.6	6.63 168	88.0 39.3	5.00 (sw) 127	58.0 26.3	4.00 (sw) 102	42.0 19.1	24.00 (s) 610	210.0 95.3	10.00 (s) 254	100.0 45.4
	16.773 426.0	16.75 425	198.6 90.1	7.00 178	101.3 45.9	—	—	—	—	—	—	—	—
18[2] DN450	18.000 457.2	18.00 457	228.0 103.4	7.50 190	108.0 50.0	5.50 (sw) 140	65.0 29.5	4.50 (sw) 144	53.2 24.1	27.00 (s) 686	273.0 123.8	11.25 (s) 286	135.0 61.2
	18.898 480.0	18.88 480	291.0 132.0	7.83 200	141.7 64.3	—	—	—	—	—	—	—	—
20[2] DN500	20.000 508.0	20.00 508	298.0 135.2	8.25 210	138.0 62.6	6.00 (sw) 152	78.6 36.0	5.00 (sw) 127	65.0 29.5	30.00 (s) 762	343.0 155.6	12.50 (s) 318	174.0 78.9
	20.866 530.0	20.88 530	355.0 161.0	8.63 219	179.0 81.2	—	—	—	—	—	—	—	—
24[2] DN600	24.000 609.6	24.00 610	438.0 198.7	10.00 254	221.0 100.2	7.00 (sw) 178	140.0 63.5	6.00 (sw) 152	60.0 27.2	36.00 (s) 914	516.0 234.1	15.00 (s) 381	251.0 113.9
	24.803 630.0	24.80 630	545.0 247.2	10.25 261	255.2 115.7	—	—	—	—	—	—	—	—
14 – 60 DN350 – DN1500	For AGS fitting information, see publication 20.05 AGS™												

[1] Gooseneck design, end-to-end dimension fittings in this size, contact your nearest Victaulic sales representative.

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

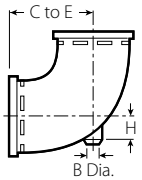
NOTE

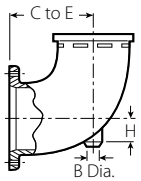
- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

4.1 DIMENSIONS

Reducing Base Support Elbow

No. R-10G Grv. × Grv.
No. R-10F Grv. × Flange



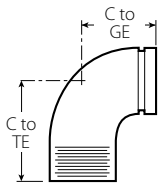


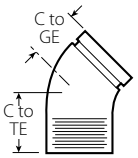
Size			No. R-10 Reducing Base Support Elbow			Approx. Weight Each	
Nominal inches DN			C to E inches mm	H inches mm	B Diameter inches mm	Grv. x Grv. lb kg	Grv. x Flange lb kg
6 DN150	x	4 DN100	9.00 229	1.25 32	1.50 38	19.0 8.6	33.0 15.0
		5	9.00 229	1.50 38	1.50 38	23.0 10.4	38.0 17.2
8 DN200	x	6 DN150	10.50 267	2.13 24	1.50 38	33.0 15.0	52.0 23.6
10 DN250	x	8 DN200	12.00 305	2.40 61	1.50 38	61.0 27.7	88.0 39.9

4.2 DIMENSIONS

Adapter Elbow

No. 18 90° Adapter Elbow
No. 19 45° Adapter Elbow





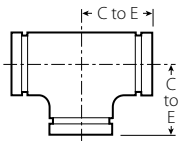
Size		No. 18 90° Adapter Elbow			No. 19 45° Adapter Elbow		
Nominal inches DN	Actual Outside Diameter inches mm	C to GE inches mm	C to TE inches mm	Approximate Weight (Each) lb kg	C to GE inches mm	C to TE inches mm	Approx. Weight (Each) lb kg
¾ DN20	1.050 26.9	2.25 57	2.25 57	0.5 0.2	1.50 38	1.50 38	0.5 0.2
1 DN25	1.315 33.7	2.25 57	2.25 57	0.5 0.2	—	—	—
1¼ DN32	1.660 42.4	2.75 70	2.75 70	0.9 0.4	—	—	—
1½ DN40	1.900 48.3	2.75 70	2.75 70	1.1 0.5	1.75 44	1.75 44	0.9 0.4
2 DN50	2.375 60.3	3.25 83	4.25 108	2.5 1.1	—	—	—
2½	2.875 73.0	3.75 95	3.75 95	3.0 1.4	2.25 57	2.25 57	2.3 1.0
3 DN80	3.500 88.9	4.25 108	6.00 152	5.8 2.6	2.50 64	4.25 108	5.0 2.3
3½ DN90	4.000 101.6	4.50 114	6.25 159	8.0 3.6	5.25 133	5.25 133	8.8 4.0
6 DN150	6.625 168.3	6.50 165	6.50 165	17.6 8.0	3.50 89	3.50 89	12.7 5.8

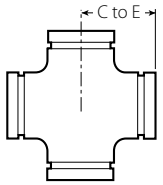
NOTE

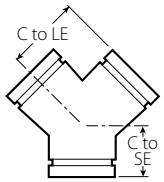
- Available with British Standard Pipe Threads, specify “BSP” clearly on order.

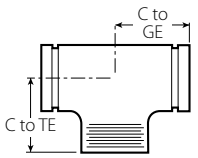
4.3 DIMENSIONS

Tees, Crosses and True Wyes









Size		No. 20 Tee		No. 35 Cross (sw)		No. 33 True Wye (sw)			No. 29M Tee with Threaded Branch		
Nominal inches DN	Actual Outside Dimeter inches mm	C to E inches mm	Approx. Weight (Each) lb kg	C to E inches mm	Approx. Weight (Each) lb kg	C to LE inches mm	C to SE inches mm	Approx. Weight (Each) lb kg	C to GE inches mm	C to TE inches mm	Approx. Weight (Each) lb kg
¾ DN20	1.050 26.9	2.25 57	0.6 0.3	2.25 57	0.9 0.4	2.25 57	2.00 51	0.7 0.3	2.25 57	2.25 (sw) 57	0.6 0.3
1 DN25	1.315 33.7	2.25 57	1.0 0.5	2.25 57	1.3 0.6	2.25 57	2.25 57	1.1 0.5	2.25 57	2.25 57	1.0 0.5
1¼ DN32	1.660 42.4	2.75 70	1.5 0.7	2.75 70	2.1 1.0	2.75 70	2.50 64	1.5 0.7	2.75 70	2.75 70	1.5 0.7
1½ DN40	1.900 48.3	2.75 70	2.0 0.9	2.75 70	2.5 1.1	2.75 70	2.75 70	1.8 0.8	2.75 70	2.75 70	2.0 0.9
2 DN50	2.375 60.3	3.25 83	3.0 1.4	3.25 83	3.8 1.7	3.25 83	2.75 70	2.5 1.1	3.25 83	4.25 108	3.0 1.4
2½	2.875 73.0	3.75 95	4.3 2.0	3.75 95	6.1 2.8	3.75 95	3.00 76	4.3 2.0	3.75 95	3.75 95	4.3 2.0
DN65	3.000 76.1	3.75 95	5.2 2.4	—	—	—	—	—	3.75 95	3.75 (sw) 95	5.2 2.4
3 DN80	3.500 88.9	4.25 108	6.8 3.0	4.25 108	10.5 4.8	4.25 108	3.25 83	6.1 2.8	4.25 108	6.00 152	6.8 3.1
3½ DN90	4.000 101.6	4.50 (sw) 114	7.9 3.6	4.50 114	11.5 5.2	4.50 114	3.50 89	9.6 4.4	4.50 114	4.50 (sw) 114	7.9 3.6
	4.250 108.0	5.00 127	15.5 7.0	—	—	—	—	—	5.00 127	5.00 (sw) 127	15.5 7.0
4 DN100	4.500 114.3	5.00 127	11.9 5.4	5.00 127	15.8 7.2	5.00 127	3.75 95	9.8 4.4	5.00 127	7.25 184	11.9 5.4
	5.000 127.0	5.25 (sw) 133	15.0 6.8	5.25 133	18.5 8.4	—	—	—	5.25 133	5.25 (sw) 133	15.0 6.8
	5.250 133.0	5.50 140	17.8 8.1	—	—	—	—	—	5.50 140	5.50 (sw) 140	17.8 8.1
DN125	5.500 139.7	5.50 140	17.8 8.1	—	—	—	—	—	5.50 140	5.50 (sw) 140	17.8 8.1
5	5.563 141.3	5.50 140	17.8 8.1	5.50 140	20.0 9.1	5.50 140	4.00 102	15.0 6.8	5.50 140	5.50 (sw) 140	17.8 8.1
	6.250 159.0	6.50 165	27.1 12.3	—	—	—	—	—	6.50 165	6.50 (sw) 165	27.1 12.3
	6.500 165.1	6.50 165	22.0 10.0	6.50 165	28.0 12.7	—	—	—	6.50 165	6.50 (sw) 165	22.0 10.0
6 DN150	6.625 168.3	6.50 165	25.7 11.7	6.50 165	28.0 12.7	6.50 165	4.50 114	22.3 10.1	6.50 165	6.50 (sw) 165	25.7 11.7
8 DN200	8.625 219.1	7.75 197	47.6 21.6	7.75 197	48.0 21.8	7.75 197	6.00 152	36.0 16.3	7.75 197	7.75 197	47.6 21.6
10 DN250	10.750 273.0	9.00 229	99.0 44.9	9.00 229	121.5 55.1	9.00 229	6.50 155	69.9 31.7	9.00 229	9.00 229	99.0 44.9
12 DN300	12.750 323.9	10.00 254	133.0 60.3	10.00 254	110.0 49.9	10.00 254	7.00 178	80.0 36.3	10.00 254	10.00 254	133.0 60.3

(s) = Carbon Steel Direct Roll Groove (OGS)

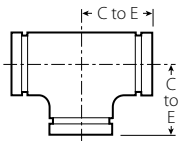
(sw) = Carbon Steel Segmentally Welded

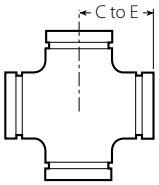
NOTE

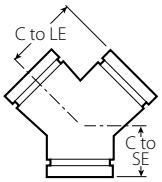
- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

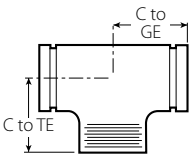
4.3 DIMENSIONS (Continued)

Tees, Crosses and True Wyes









Size		No. 20 Tee		No. 35 Cross (sw)		No. 33 True Wye (sw)			No. 29M Tee with Threaded Branch		
Nominal inches DN	Actual Outside Dimeter inches mm	C to E inches mm	Approx. Weight (Each) lb kg	C to E inches mm	Approx. Weight (Each) lb kg	C to LE inches mm	C to SE inches mm	Approx. Weight (Each) lb kg	C to GE inches mm	C to TE inches mm	Approx. Weight (Each) lb kg
14[2] DN350	14.000 355.6	11.00 (sw) 279	145.0 65.8	11.00 279	198.0 89.8	11.00 279	7.50 191	134.2 60.8	—	—	—
	377.0	11.50 292	145.0 65.8	—	—	—	—	—	—	—	—
16[2] DN400	16.000 406.4	12.00 (sw) 305	186.0 84.4	12.00 305	250.0 113.4	12.00 305	8.00 203	167.0 75.7	—	—	—
	426.0	13.00 300	186.0 84.4	—	—	—	—	—	—	—	—
18[2] DN450	18.000 457.0	15.50 (sw) 394	260.0 117.9	15.50 394	350.0 158.8	15.50 394	8.50 216	234.0 106.1	—	—	—
	480.0	14.63 372	256.0 116.1	—	—	—	—	—	—	—	—
20[2] DN500	20.000 508.0	17.25 (sw) 438	336.0 152.4	17.25 438	452.0 205.0	17.25 438	9.00 229	281.0 127.5	—	—	—
	530.0	15.38 (sw) 391	339.0 153.8	—	—	—	—	—	—	—	—
24[2] DN600	24.000 610.0	20.00 (sw) 508	592.0 268.5	20.00 508	795.0 360.6	20.00 508	10.00 254	523.0 237.2	—	—	—
	630.0	17.38 (sw) 441	473.0 214.5	—	—	—	—	—	—	—	—
14 – 60 DN350 – DN1500	**For AGS fitting information, see** publication 20.05 AGS™										

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

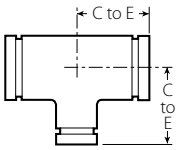
NOTE

- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

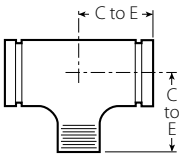
4.4 DIMENSIONS

Reducing Tee

No. 25 Grooved Branch
No. 29T Threaded Branch



No. 25



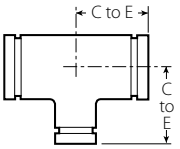
No. 29T

Size						No. 25 Std.	No. 29T w/ Thd. Branch	Approx. Weight (Each)
Nominal inches DN						C to E inches mm	C to E inches mm	lb kg
1 DN25	x	1 DN25	x	¾ DN20		2.25 (sw) 57	2.25 (sw) 57	1.0 0.5
1 ¼ DN32	x	1 ¼ DN32	x	1 DN25		2.75 (sw) 70	2.75 (sw) 70	1.3 0.6
1 ½ DN40	x	1 ½ DN40	x	¾ DN20		2.75 (sw) 70	2.75 (sw) 70	1.5 0.7
				1 DN25		2.75 (sw) 70	2.75 (sw) 70	1.5 0.7
				1 ¼ DN32		2.75 (sw) 70	2.75 (sw) 70	1.7 0.8
2 DN50	x	2 DN50	x	¾ DN20		3.25 83	3.25 83	2.5 1.1
				1 DN25		3.25 83	3.25 83	2.7 1.2
				1 ¼ DN32		3.25 (sw) 83	3.25 (sw) 83	1.8 0.8
				1 ½ DN40		3.25 83	3.25 (sw) 83	3.0 1.4
2 ½	x	2 ½	x	¾ DN20		3.75 (sw) 95	3.75 (sw) 95	3.9 1.8
				1 DN25		3.75 95	3.75 (sw) 95	3.8 1.7
				1 ¼ DN32		3.75 95	3.75 95	4.2 1.7
				1 ½ DN40		3.75 95	3.75 95	3.9 1.8
				2 DN50		3.75 95	3.75 (sw) 95	4.5 2.0
3 DN80	x	3 DN80	x	¾ DN20		4.25 (sw) 108	4.25 (sw) 108	5.7 2.6
				1 DN25		4.25 108	4.25 108	6.1 2.8
				1 ¼ DN32		4.25 108	4.25 108	8.0 3.6
				1 ½ DN40		4.25 108	4.25 (sw) 108	6.5 2.9
				2 DN50		4.25 108	4.25 (sw) 108	6.2 2.8
				2 ½		4.25 108	4.25 (sw) 108	6.4 2.9

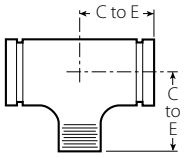
(s) = Carbon Steel Direct Roll Groove (OGS)
(sw) = Carbon Steel Segmentally Welded

NOTE

- Cast fitting available. Contact Victaulic for details.



No. 25



No. 29T

Size						No. 25 Std.	No. 29T w/ Thd. Branch	Approx. Weight (Each)
Nominal inches DN						C to E inches mm	C to E inches mm	lb kg
4 DN100	x	4 DN100	x	¾ DN20		5.00 (sw) 127	5.00 (sw) 127	8.0 3.6
				1 DN25		5.00 127	5.00 127	7.8 3.5
				1 ¼ DN32		5.00 (sw) 127	5.00 (sw) 127	9.6 4.4
				1 ½ DN40		5.00 127	5.00 127	10.2 4.6
				2 DN50		5.00 127	5.00 127	11.2 5.1
				2 ½		5.00 127	5.00 127	11.4 5.2
				3 DN80		5.00 127	5.00 127	11.6 5.3
5	x	5	x	1 DN25		5.50 (sw) 140	5.50 (sw) 140	14.0 6.4
				1 ½ DN40		5.50 (sw) 140	5.50 (sw) 140	14.3 6.5
				2 DN50		5.50 (sw) 140	5.50 (sw) 140	14.5 6.6
				2 ½		5.50 140	5.50 (sw) 140	15.2 6.9
				3 DN80		5.50 140	5.50 (sw) 140	16.6 7.5
				4 DN100		5.50 140	5.50 (sw) 140	16.7 7.6
6 DN150	x	6 DN150	x	1 DN25		6.50 (sw) 165	6.50 (sw) 165	23.0 10.4
				1 ½ DN40		6.50 (sw) 165	6.50 (sw) 165	24.0 10.9
				2 DN50		6.50 165	6.50 165	21.6 9.8
				2 ½		6.50 165	6.50 165	21.4 11.7
				3 DN80		6.50 165	6.50 165	26.5 12.0
				4 DN100		6.50 165	6.50 165	25.0 11.3
				5		6.50 165	6.50 165	23.2 10.5
6 ½	x	6 ½	x	3 DN80		6.50 165	6.50 (sw) 165	24.0 10.9
				4 DN100		6.50 165	6.50 (sw) 165	25.0 11.3

(s) = Carbon Steel Direct Roll Groove (OGS)
(sw) = Carbon Steel Segmentally Welded

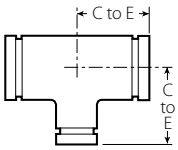
NOTE

- Cast fitting available. Contact Victaulic for details.

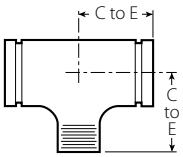
4.4 DIMENSIONS (Continued)

Reducing Tee

No. 25 Grooved Branch
No. 29T Threaded Branch



No. 25



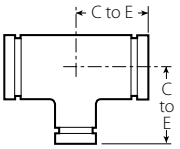
No. 29T

Size				No. 25 Std.	No. 29T w/ Thd. Branch	Approx. Weight (Each)
Nominal inches DN				C to E inches mm	C to E inches mm	lb kg
8 DN200	x	8 DN200	x 1 ½ DN40	7.75 (sw) 197	7.75 (sw) 197	33.0 15.0
			2 DN50	7.75 (sw) 197	7.75 (sw) 197	33.5 15.2
			2 ½	7.75 (sw) 197	7.75 (sw) 197	39.0 17.7
			3 DN80	7.75 (sw) 197	7.75 (sw) 197	33.6 15.2
			4 DN100	7.75 197	7.75 197	41.8 19.0
			5	7.75 (sw) 197	7.75 (sw) 197	34.0 15.4
			6 DN150	7.75 197	7.75 197	42.3 19.2
			165.1mm	7.75 (sw) 197	7.75 (sw) 197	48.0 21.8
10 DN250	x	10 DN250	x 1 ½ DN40	9.00 229	9.00 229	62.0 28.1
			2 DN50	9.00 (sw) 229	9.00 (sw) 229	62.0 28.1
			2 ½	9.00 (sw) 229	9.00 (sw) 229	62.4 28.3
			3 DN80	9.00 (sw) 229	9.00 (sw) 229	60.0 27.2
			4 DN100	9.00 (sw) 229	9.00 (sw) 229	61.0 27.7
			5	9.00 (sw) 229	9.00 (sw) 229	52.0 23.6
			6 DN150	9.00 (sw) 229	9.00 (sw) 229	59.0 26.8
			8 DN200	9.00 (sw) 229	9.00 (sw) 229	64.7 29.3

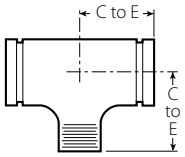
(s) = Carbon Steel Direct Roll Groove (OGS)
(sw) = Carbon Steel Segmentally Welded

NOTE

- Cast fitting available. Contact Victaulic for details.



No. 25



No. 29T

Size				No. 25 Std.	No. 29T w/ Thd. Branch	Approx. Weight (Each)
Nominal inches DN				C to E inches mm	C to E inches mm	lb kg
12 DN300	x	12 DN300	x 1 DN25	10.00 (sw) 254	10.00 (sw) 254	77.0 34.9
			2 DN50	10.00 (sw) 254	10.00 (sw) 254	80.0 36.3
			2 ½	10.00 (sw) 254	10.00 (sw) 254	78.0 35.4
			3 DN80	10.00 (sw) 254	10.00 (sw) 254	82.0 37.2
			4 DN100	10.00 (sw) 254	10.00 (sw) 254	80.0 36.3
			5	10.00 (sw) 254	10.00 (sw) 254	75.0 34.0
			6 DN150	10.00 (sw) 254	10.00 (sw) 254	75.0 34.0
			8 DN200	10.00 (sw) 254	10.00 (sw) 254	80.0 36.3
			10 DN250	10.00 (sw) 254	10.00 (sw) 254	84.0 38.1
14[2] DN350	x	14 DN350	x 4 DN100	11.00 (sw) 279	11.00 (sw) 279	102.0 46.3
			6 DN150	11.00 (sw) 279	11.00 (sw) 279	108.2 49.1
			8 DN200	11.00 279	11.00 279	112.0 50.8
			10 DN250	11.00 279	11.00 279	120.0 54.4
			12 DN300	11.00 279	11.00 279	129.1 58.6
16[2] DN400	x	16 DN400	x 4 DN100	12.00 305	12.00 305	130.0 59.0
			6 DN150	12.00 (sw) 305	12.00 (sw) 305	133.5 60.6
			8 DN200	12.00 305	12.00 305	145.0 65.8
			10 DN250	12.00 305	12.00 305	149.5 67.8
			12 DN300	12.00 305	12.00 305	154.0 69.9
			14 DN350	12.00 (sw) 305	—	167.0 75.8

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.

(s) = Carbon Steel Direct Roll Groove (OGS)
(sw) = Carbon Steel Segmentally Welded

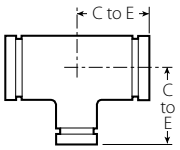
NOTE

- Cast fitting available. Contact Victaulic for details.

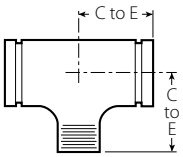
4.4 DIMENSIONS (Continued)

Reducing Tee

No. 25 Grooved Branch
No. 29T Threaded Branch



No. 25



No. 29T

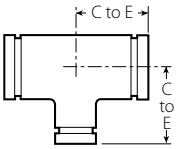
Size				No. 25 Std.	No. 29T w/ Thd. Branch	Approx. Weight (Each)
Nominal inches DN				C to E inches mm	C to E inches mm	lb kg
18[2] DN450	x	18 DN450	x 4 DN100	15.50 (sw) 394	15.50 (sw) 394	194.0 88.0
			6 DN150	15.50 (sw) 394	15.50 (sw) 394	200.0 90.7
			8 DN200	15.50 (sw) 394	15.50 (sw) 394	202.0 91.6
			10 DN250	15.50 394	15.50 394	212.0 96.2
			12 DN300	15.50 394	15.50 394	222.6 101.0
			14 DN350	15.50 394	—	230.1 104.4
			16 DN400	15.50 394	—	247.6 112.3
20[2] DN500	x	20 DN500	x 6 DN150	17.25 438	17.25 438	240.0 108.9
			8 DN200	17.25 438	17.25 438	244.0 110.7
			10 DN250	17.25 438	17.25 438	256.0 116.1
			12 DN300	17.25 438	17.25 438	264.0 119.8
			14 DN350	17.25 438	—	275.0 124.7
			16 DN400	17.2 5 438	—	288.6 130.9
			18 DN450	17.25 438	—	297.0 134.7

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.

(s) = Carbon Steel Direct Roll Groove (OGS)
(sw) = Carbon Steel Segmentally Welded

NOTE

- Cast fitting available. Contact Victaulic for details.



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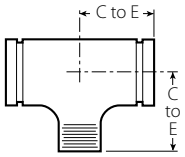


No. 29T

Size				No. 25 Std.	No. 29T w/ Thd. Branch	Approx. Weight (Each)
Nominal inches DN				C to E inches mm	C to E inches mm	lb kg
24[2] DN600	x	24 DN600	x 8 DN200	20.00 508	20.00 508	340.0 154.2
			10 DN250	20.00 508	20.00 508	343.9 156.0
			12 DN300	20.00 508	20.00 508	352.8 160.0
			14 DN350	20.00 508	—	360.0 163.3
			16 DN400	20.00 508	—	378.0 171.5
			18 DN450	20.00 508	—	380.0 172.4
			20 DN500	20.00 508	—	373.0 169.2
14 – 60 DN350 – 1500				For AGS fitting information, see publication 20.05 AGS™		

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.

(s) = Carbon Steel Direct Roll Groove (OGS)
(sw) = Carbon Steel Segmentally Welded

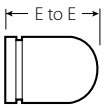
NOTES

- No. 29T Threaded Outlet Reducing Tees are supplied NPT and are available with British Standard threads. For British Standard specify "BSP" clearly on order.
- All fittings are ductile iron unless otherwise noted with an (sw) or (s).
- Cast fitting available. Contact Victaulic for details.

4.5 DIMENSIONS

Bull Plug

No. 61



No. 61

Size		No. 61 Bull Plug (s)	
Nominal inches DN	**Actual Outside Diameter** inches mm	**E to E** inches mm	**Approx. Weight (Each)** lb kg
2 DN50	2.375 60.3	4.00 102	2.5 1.1
2 ½	2.875 73.0	5.00 127	3.0 1.4
3 DN80	3.500 88.9	6.00 152	4.5 2.0
4 DN100	4.500 114.3	7.00 178	7.5 3.4
5	5.563 141.3	8.00 203	12.0 5.4
6 DN150	6.625 168.5	10.00 254	17.0 7.7

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

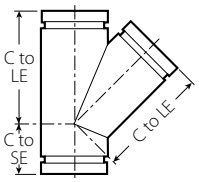
NOTES

- Steel dish caps available through 24"/DN600, contact Victaulic.
- No. 61 Bull Plugs should be used in vacuum service with Style 72 or 750 couplings.
- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

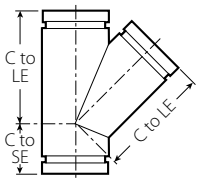
4.6 DIMENSIONS

45° Lateral

No. 30



No. 30



No. 30

Size		No. 30 45° Lateral		Weight
Nominal inches DN	Actual Outside Diameter inches mm	C to LE inches mm	C to SE inches mm	Approx. (Each) lb kg
¾ DN20	1.050 26.9	4.50 (sw) 114	2.00 (sw) 51	1.0 0.5
1 DN25	1.315 33.7	5.00 (sw) 127	2.25 (sw) 57	1.7 0.8
1¼ DN32	1.660 42.4	5.75 146	2.50 64	2.5 (d) 1.1
1½ DN40	1.900 48.3	6.25 (sw) 159	2.75 (sw) 70	3.5 1.6
2 DN50	2.375 60.3	7.00 (sw) 178	2.75 (sw) 70	5.0 2.3
2½	2.875 73.0	7.75 (sw) 197	3.00 (sw) 76	9.0 4.1
DN65	3.000 76.1	8.50 (sw) 216	3.25 (sw) 83	11.0 5.0
3 DN80	3.500 88.9	8.50 216	3.25 83	11.7 (d) 5.4
3½ DN90	4.000 101.6	10.00 (sw) 254	3.50 (sw) 89	17.8 8.1
4 DN100	4.500 114.3	10.50 267	3.75 95	22.2 (d) 10.1
5	5.563 141.3	12.50 (sw) 318	4.00 (sw) 102	21.8 9.9

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

Size		No. 30 45° Lateral		Weight
Nominal inches DN	Actual Outside Diameter inches mm	C to LE inches mm	C to SE inches mm	Approx. (Each) lb kg
	6.500 165.1	14.00 (sw) 356	4.50 (sw) 114	43.6 19.8
6 DN150	6.625 168.3	14.00 (sw) 356	4.50 (sw) 114	43.6 49.8
8 DN200	8.625 219.1	18.00 (sw) 457	6.00 (sw) 152	72.0 32.7
10 DN250	10.750 273.0	20.50 (sw) 521	6.50 (sw) 165	105.0 47.6
12 DN300	12.750 323.9	23.00 (sw) 584	7.00 (sw) 178	165.0 74.8
14[2] DN350	14.000 355.6	26.50 (sw) 673	7.50 (sw) 191	276.0 125.2
16[2] DN400	16.000 406.4	29.00 (sw) 737	8.00 (sw) 203	344.2 156.1
18[2] DN450	18.000 457.0	32.00 (sw) 813	8.50 (sw) 216	429.0 194.6
20[2] DN500	20.000 508.0	35.00 (sw) 889	9.00 (sw) 229	500.0 226.8
24[2] DN600	24.000 610.0	40.00 (sw) 1016	10.00 (sw) 254	715.0 324.3
14 – 60 DN350 – DN1500	**For AGS fitting information, see** publication 20.05 AGS™			

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

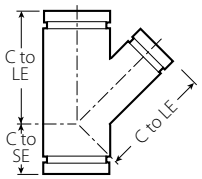
NOTE

- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

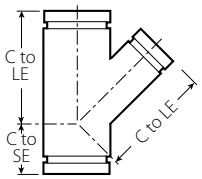
4.7 DIMENSIONS

45° Reducing Lateral

No. 30-R



No. 30-R



No. 30-R

Size						No 30-R 45° Reducing Lateral		
Nominal inches DN						C to LE inches mm	C to SE inches mm	Approx. Weight (Each) lb kg
3 DN80	x	3 DN80	x	2 DN50		8.50 216	3.25 83	9.8 4.4
				2½		8.50 216	3.25 83	9.8 4.4
4 DN100	x	4 DN100	x	2 DN50		10.50 267	3.75 95	10.0 4.5
				2½		10.50 267	3.75 95	10.0 4.5
				3 DN80		10.50 267	3.75 95	18.3 8.3
5	x	5	x	2 DN50		12.50 318	4.00 102	24.0 10.9
				3 DN80		12.50 318	4.00 102	27.0 12.2
				4 DN100		12.50 318	4.00 102	26.5 12.0
6 DN150	x	6 DN150	x	3 DN80		14.00 356	4.50 114	37.0 16.8
				4 DN100		14.00 356	4.50 114	36.0 16.3
				5		14.00 356	4.50 114	44.7 20.3
8 DN200	x	8 DN200	x	4 DN100		18.00 457	6.00 152	62.0 28.1
				5		18.00 457	6.00 152	75.5 34.2
				6 DN150		18.00 457	6.00 152	82.0 37.2
10 DN250	x	10 DN250	x	4 DN100		20.50 521	6.50 165	104.8 47.5
				5		20.50 521	6.50 165	99.0 44.9
				6 DN150		20.50 521	6.50 165	105.8 48.0
				8 DN200		20.50 521	6.50 165	118.0 53.5
12 DN300	x	12 DN300	x	5		23.00 584	7.00 178	122.0 55.3
				6 DN150		23.00 584	7.00 178	137.0 62.1
				8 DN200		23.00 584	7.00 178	147.0 66.7
				10 DN250		23.00 584	7.00 178	167.0 75.8

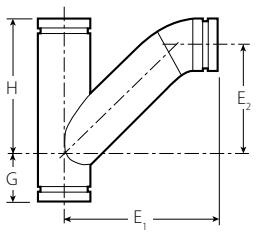
Size						No 30-R 45° Reducing Lateral		
Nominal inches DN						C to LE inches mm	C to SE inches mm	Approx. Weight (Each) lb kg
14[2] DN350	x	14 DN350	x	4 DN100		26.50 673	7.50 191	172.0 78.0
				6 DN150		26.50 673	7.50 191	187.0 84.8
				8 DN200		26.50 673	7.50 191	205.8 93.4
				10 DN250		26.20 673	7.50 191	235.0 106.6
				12 DN300		26.50 673	7.50 191	250.0 113.4
16[2] DN400	x	16 DN400	x	6 DN150		29.00 737	8.00 203	215.0 97.5
				8 DN200		29.00 737	8.00 203	252.5 114.5
				10 DN250		29.00 737	8.00 203	265.0 120.2
				12 DN300		29.00 737	8.00 203	295.0 133.8
				14 DN350		29.00 737	8.00 203	305.0 138.3
18[2] DN450	x	18 DN450	x	6 DN150		32.00 813	8.50 216	274.0 124.3
				8 DN200		32.00 813	8.50 216	275.0 124.7
				12 DN300		32.00 813	8.50 216	347.0 157.4
				14 DN350		32.00 813	8.50 216	350.0 158.8
				16 DN400		32.00 813	8.50 216	362.0 164.2
20[2] DN500	x	20 DN500	x	12 DN300		35.00 889	9.00 229	415.0 188.2
				14 DN350		35.00 889	9.00 229	420.0 190.5
				16 DN400		35.00 899	10.00 229	425.0 192.8
24[2] DN600	x	24 DN600	x	16 DN400		40.00 1016	10.00 254	425.0 192.8
				20 DN600		40.00 1016	10.00 254	570.0 258.6
14 – 60 DN350 – DN1500						For AGS fitting information, see publication 20.05 AGS™		

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.

4.8 DIMENSIONS

Tee Wye

No. 32



No. 32

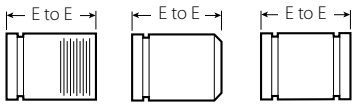
Size					No. 32 Tee Wye (sw)				
Nominal inches DN					G inches mm	H inches mm	E1 inches mm	E2 inches mm	Approx. Weight (Each) lb kg
2 DN50	x	2 DN50	x	2 DN50	2.75 70	7.00 178	9.00 229	4.63 118	6.4 2.9
2½	x	2½	x	2½	3.00 76	7.75 197	10.50 267	5.75 146	11.5 5.2
3 DN80	x	3 DN80	x	3 DN80	3.25 83	8.50 216	11.50 292	6.50 165	14.3 6.5
3½ DN90	x	3½ DN90	x	3½ DN90	3.25 89	10.00 254	13.00 330	7.75 197	22.9 10.4
4 100	x	4 DN100	x	4 DN100	3.75 95	10.50 267	13.63 346	8.13 207	26.0 11.8
5	x	5	x	5	4.00 102	12.50 318	16.13 410	10.00 254	48.0 21.8
6 DN150	x	6 DN150	x	6 DN150	4.50 114	14.00 356	18.25 464	11.50 292	60.5 27.4
8 DN200	x	8 DN200	x	8 DN200	6.00 152	18.00 457	23.25 591	15.25 387	127.1 57.7
10 DN250	x	10 DN250	x	10 DN250	6.50 165	20.50 521	27.25 692	18.00 457	190. 0 86.2
12 DN300	x	12 DN300	x	12 DN300	7.00 178	23.00 584	31.00 787	20.50 521	240.0 108.9

(s) = Carbon Steel Direct Roll Groove (OGS)
(sw) = Carbon Steel Segmentally Welded

4.9 DIMENSIONS

Adapter Nipple

No. 40[12] Grv. × Thd.
No. 42 Grv. × Bev.
No. 43 Grv. × Grv.



No. 40 No.42 No.43

Size		No. 40, 42, 43 Adapter Nipple (s)	
Nominal inches DN	Actual Outside Diameter inches mm	E to E inches mm	Approx. Weight (Each) lb kg
¾ DN20	1.050 26.9	3.00 76	0.3 0.1
1 25	1.315 33.7	3.00 76	0.4 0.2
1¼ DN32	1.660 42.4	4.00 102	0.8 0.4
1½ 40	1.900 48.3	4.00 102	0.9 0.4
2 DN50	2.375 60.3	4.00 102	1.2 0.5
2½	2.875 73.0	4.00 102	1.9 0.9
3 DN80	3.500 88.9	4.00 102	2.5 1.1
3½ DN90	4.000 101.6	4.00 102	2.1 0.9
4 DN100	4.500 114.3	6.00 152	5.5 2.5
5	5.563 141.3	6.00 152	7.4 3.4
6 DN150	6.625 168.3	6.00 152	9.5 4.3
8 DN200	8.625 219.1	6.00 152	14.2 6.4
10 DN250	10.750 273.0	8.00 203	27.0 12.2
12 DN300	12.750 323.9	8.00 203	33.0 15.0

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

NOTES

- All fittings are ductile iron unless otherwise noted with an (sw) or (s).
- For pump package nipples with 1 ½"/40 mm hole cut to receive Style 923 *Vic-Let* or Style 924 *Vic-O-Well* request special No. 40, 42 or 43 nipples and specify No. 40-H, 42-H or 43-H on order. NOTE: 4 – 12"/DN100 – DN300 diameter — 8"/200 mm minimum length required.
- For roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.
- Available with British Standard Pipe Threads, specify "BSP" clearly on order.

4.10 DIMENSIONS

Cap

No. 60

No. 60

Size		No. 60 Cap	
Nominal inches DN	Actual Outside Diameter inches mm	"T" Thickness inches mm	Approx. Weight (Each) lb kg
¾ DN20	1.050 26.9	0.88 22	0.2 0.1
1 25	1.315 33.7	0.88 22	0.3 0.1
1¼ DN32	1.660 42.4	0.88 22	0.3 0.1
1½ DN40	1.900 48.3	0.88 22	0.5 0.2
2 DN50	2.375 60.3	0.88 22	0.6 0.3
2½	2.875 73.0	0.88 22	1.0 0.5
DN65	3.000 76.1	0.88 22	1.2 0.5
3 DN80	3.500 88.9	0.88 22	1.2 0.5
3½ DN90	4.000 101.6	0.88 22	2.5 1.1
	4.250 108.0	1.00 25	2.3 1.0
4 DN100	4.500 114.3	1.00 25	2.5 1.1
	5.250 133.0	1.00 25	4.5 2.0
DN125	5.500 139.7	1.00 25	4.5 2.0
5	5.563 141.3	1.00 25	4.6 2.1

No. 60

Size		No. 60 Cap	
Nominal inches DN	Actual Outside Diameter inches mm	"T" Thickness inches mm	Approx. Weight (Each) lb kg
	6.250 159.0	1.00 25	6.8 3.1
	6.500 165.1	1.00 25	7.3 3.3
6 DN150	6.625 168.3	1.00 25	6.1 2.8
8 DN200	8.625 219.1	1.19 30	13.1 5.9
10 DN250	10.750 273.0	1.25 32	21.0 9.5
12 DN300	12.750 323.9	1.25 32	35.6 16.2
14[2] DN350	14.000 355.6	9.50 (s) 241	+
16[2] DN400	16.000 406.4	10.00 (s) 254	+
18[2] DN450	18.000 457.0	11.00 (s) 279	+
20[2] DN500	20.000 508.0	12.00 (s) 305	+
24[2] DN600	24.000 610.0	13.50 (s) 343	+
14 – 60 DN350 – DN1500	**For AGS fitting information, see** publication 20.05 AGS™		

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

+ Contact Victaulic for details.

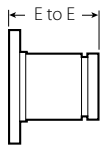
NOTES

- No. 60 cap is not suitable for use in vacuum service with Style 72 or 750 couplings. No. 61 bull plugs should be used.
- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

4.11 DIMENSIONS

Flanged Adapter Nipple

No. 41 ANSI Class 125
No. 45F ANSI Class 150 Flat Face
No. 45R ANSI Class 150 Raised Face
No. 46F ANSI Class 300 Flat Face
No. 46R ANSI Class 300 Raised Face
No. 45RE PN10/PN16 Raised Face



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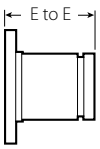

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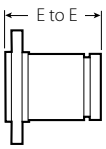

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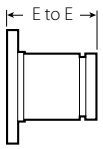

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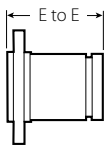

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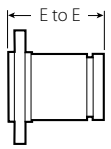


No. 45RE

Size		No. 41 ANSI 125 Flange Adapter Nipple		No. 45F and No. 45R ANSI 150 Flanged Adapter Nipple (s)		No. 46F and No. 46R ANSI 300 Flanged Adapter Nipple (s)		No. 45RE Flanged Adapter Nipple	
Nominal inches DN	Actual Outside Diameter inches mm	E to E inches mm	Approx. Weight (Each) lb kg	E to E inches mm	Approx. Weight (Each) lb kg	E to E inches mm	Approx. Weight (Each) lb kg	E to E inches mm	Approx. Weight (Each) lb kg
¾ DN20	1.050 26.9	3.00 76	—	3.00 76	2.3 1.0	3.00 76	3.3 1.5	—	—
1 DN25	1.315 33.7	3.00 76	2.5 1.1	3.00 76	2.7 1.2	3.00 76	3.9 1.8	—	—
1¼ DN32	1.660 42.4	4.00 102	3.0 1.4	4.00 102	3.3 1.5	4.00 102	4.8 2.2	—	—
1½ DN40	1.900 48.3	4.00 102	3.5 1.6	4.00 102	3.9 1.8	4.00 102	6.9 3.1	—	—
2 DN50	2.375 60.3	4.00 102	5.5 2.5	4.00 102	6.0 2.7	4.00 102	8.2 3.7	2.50 64	5.3 2.4
2½	2.875 73.0	4.00 102	8.0 3.6	4.00 102	9.9 4.5	4.00 102	11.9 5.4	—	—
DN65	3.000 76.1	—	—	—	—	—	—	2.50 64	6.5 2.9
3 DN80	3.500 88.9	4.00 102	9.5 4.3	4.00 102	11.7 5.3	4.00 102	16.5 7.5	2.50 64	8.2 3.7
3½ DN90	4.000 101.6	4.00 102	12.0 5.4	4.00 102	15.1 6.8	4.00 102	20.1 9.1	—	—
4 DN100	4.500 114.3	6.00 152	16.7 7.6	6.00 152	18.5 8.4	6.00 152	27.4 12.4	2.75 70	10.0 45
5	5.563 141.3	6.00 152	21.5 9.8	6.00 152	21.3 9.7	6.00 152	35.3 16.0	—	—
DN125	5.500 139.7	—	—	—	—	—	—	2.75 70	16.3 7.4
6 DN150	6.625 168.3	6.00 152	26.5 12.0	6.00 152	27.5 12.5	6.00 152	47.5 21.5	2.75 70	16.3 7.4
	6.500 165.1	—	—	—	—	—	—	—	—
8 DN200	8.625 219.1	6.00 152	39.0 17.7	6.00 152	41.3 18.8	6.00 152	70.3 31.9	—	—
10 DN250	10.750 273.0	8.00 203	57.0 25.9	8.00 203	59.3 27.1	8.00 203	100.8 45.7	—	—
12 DN300	12.750 323.9	8.00 203	41.0 18.6	8.00 203	40.0 40.0	8.00 203	146.2 66.3	—	—
14[2] DN350	14.000 355.6	8.00 203	—	8.00 203	+	8.00 203	+	—	—
16[2] DN400	16.000 406.4	8.00 203	—	8.00 203	+	8.00 203	+	—	—
18[2] DN450	18.000 457.0	8.00 203	—	8.00 203	+	8.00 203	+	—	—

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.

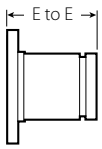
(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

4.11 DIMENSIONS (Continued)

Flanged Adapter Nipple

No. 41 ANSI Class 125
No. 45F ANSI Class 150 Flat Face
No. 45R ANSI Class 150 Raised Face
No. 46F ANSI Class 300 Flat Face
No. 46R ANSI Class 300 Raised Face
No. 45RE PN10/PN16 Raised Face



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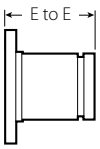

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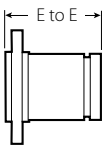

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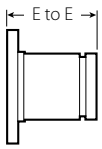

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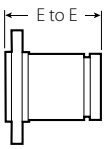

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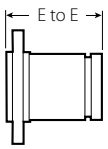


No. 45RE

Size		No. 41 ANSI 125 Flange Adapter Nipple		No. 45F and No. 45R ANSI 150 Flanged Adapter Nipple (s)		No. 46F and No. 46R ANSI 300 Flanged Adapter Nipple (s)		No. 45RE Flanged Adapter Nipple (s)	
Nominal inches DN	Actual Outside Diameter inches mm	E to E inches mm	Approx. Weight (Each) lb kg	E to E inches mm	Approx. Weight (Each) lb kg	E to E inches mm	Approx. Weight (Each) lb kg	E to E inches mm	Approx. Weight (Each) lb kg
20[2] DN500	20.000 508.0	8.00 203	—	8.00 203	+	8.00 203	+	—	—
24[2] DN600	24.000 610.0	8.00 203	—	8.00 203	+	8.00 203	+	—	—
14 – 60 DN350 – DN1500	**For AGS fitting information, see** publication 20.05								

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

+ Contact Victaulic for details

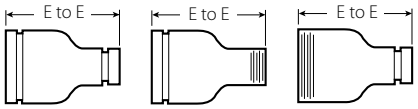
NOTE

- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

4.12 DIMENSIONS

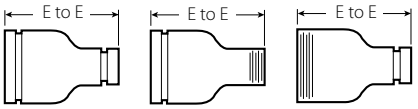
Swaged Nipple

No. 53 Grv. × Grv.
No. 54 Grv. × Thd.
No. 55 Thd. × Grv.



No. 53 No. 54 No. 55

Size			No. 53, 54, and 55 Swaged Nipples (s)	
Nominal inches DN			E to E inches mm	Approx. Weight (Each) lb kg
2 DN50	x	1 DN25	6.50 165	2.0 0.9
		1¼ DN32	6.50 165	2.0 0.9
		1½ DN40	6.50 165	2.0 0.9
2½	x	1 DN25	7.00 178	3.0 1.4
		1¼ DN32	7.00 178	3.0 1.4
		1½ DN40	7.00 178	3.0 1.4
		2 DN50	7.00 178	3.0 1.4
3 DN80	x	1 DN25	8.00 203	4.5 2.0
		1¼ DN32	8.00 203	4.5 2.0
		1½ DN40	8.00 203	4.5 2.0
		2 DN50	8.00 203	4.5 2.0
		2½	8.00 203	4.5 2.0
3½ DN90	x	3 DN80	8.00 203	6.8 3.1
4 DN100	x	1 DN25	9.00 229	7.5 3.4
		1¼ DN32	9.00 229	7.5 3.4
		1½ DN40	9.00 229	7.5 3.4
		2 DN50	9.00 229	7.5 3.4
		2½	9.00 229	7.5 3.4
		3 DN80	9.00 229	7.5 3.4
		3½ DN90	9.00 229	7.5 3.4



No. 53 No. 54 No. 55

Size			No. 53, 54, and 55 Swaged Nipples (s)	
Nominal inches DN			E to E inches mm	Approx. Weight (Each) lb kg
5	x	2 DN50	11.00 279	11.5 5.2
		3 DN80	11.00 279	11.3 5.1
		4 DN100	11.00 279	11.5 5.2
6 DN150	x	1 DN25	12.00 305	17.0 7.7
		1¼ DN32	12.00 305	17.0 7.7
		1½ DN40	12.00 305	17.2 7.8
		2 DN50	12.00 305	17.4 7.9
		2½	12.00 305	17.4 7.9
		3 DN80	12.00 305	17.4 7.9
		3½ DN90	12.00 305	17.4 7.9
		4 DN100	12.00 305	17.5 7.9
		4½	12.00 305	17.5 7.9
		5	12.00 305	17.5 7.9
8 DN200	x	6 DN150	+	20.0 9.1

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

+ Contact Victaulic for details

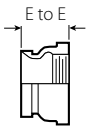
NOTE

- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

4.13 DIMENSIONS

Female Threaded Adapter

No. 80



No. 80

Size		No. 80 Female Threaded Adapter	
Nominal inches DN	**Actual Outside Diameter** inches mm	**E to E** inches mm	**Approx. Weight (Each)** lb kg
¾ DN20	1.050 26.9	2.00 51	1.0 0.5
1 DN25	1.315 33.7	2.06 52	1.0 0.5
1¼ DN32	1.660 42.4	2.31 (sw) 59	1.5 0.7
1½ DN40	1.900 48.3	2.31 (sw) 59	1.5 0.7
2 DN50	2.375 60.3	2.50 64	1.4 0.6
2½	2.875 73.0	2.75 70	1.5 0.7
3 DN80	3.500 88.9	2.75 70	2.9 1.3
4 DN100	4.500 114.3	3.25 83	4.5 2.0

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

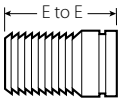
NOTES

- Available with British Standard Pipe Threads, specify “BSP” clearly on order.
- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

4.14 DIMENSIONS

Hose Nipple

No. 48



No. 48

Size		No. 48 Hose Nipple (s)	
Nominal inches DN	**Actual Outside Diameter** inches mm	**E to E** inches mm	**Approx. Weight (Each)** lb kg
¾ DN20	1.050 26.9	3.12 79	0.3 0.1
1 DN25	1.315 33.7	3.38 86	0.4 0.2
1¼ DN32	1.660 42.4	3.88 98	0.6 0.3
1½ DN40	1.900 48.3	3.88 98	0.8 0.4
2 DN50	2.375 60.3	4.50 114	1.1 0.5
2½	2.875 73.0	5.38 137	2.0 0.9
3 DN80	3.500 88.9	5.75 146	3.2 1.5
4 DN100	4.500 114.3	7.00 178	4.9 2.2
5	5.563 141.3	8.75 222	8.0 3.6
6 DN150	6.625 168.3	10.13 257	14.3 6.5
8 DN200	8.625 219.1	11.88 302	24.7 11.2
10 DN250	10.750 273.0	12.50 318	40.1 18.2
12 DN300	12.750 323.9	14.50 368	62.0 28.1

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

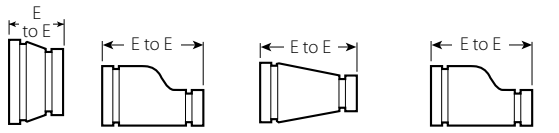
NOTE

- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

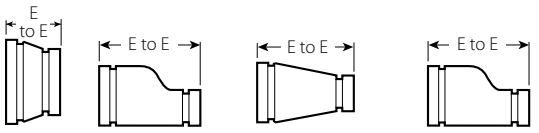
4.15 DIMENSIONS

Concentric/Eccentric Reducer

No. 50 Concentric
No. 51 Eccentric



No. 50 | No. 51 | Fabricated Steel No. 50 | Fabricated Steel No. 51



No. 50 | No. 51 | Fabricated Steel No. 50 | Fabricated Steel No. 51

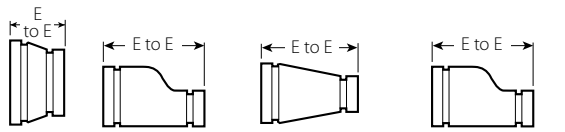
Size			No. 50 Concentric Reducer		No. 51 Eccentric Reducer	
Nominal inches DN			E to E inches mm	Approx. Weight (Each) lb kg	E to E inches mm	Approx. Weight (Each) lb kg
1¼ DN32	x	¾ DN20	+	1.9 0.9	—	—
		1 DN25	+	1.9 0.9	—	—
1½ DN40	x	¾ DN20	+	1.4 0.6	—	—
		1 DN25	2.50 64	0.8 0.4	8.50 (sw) 216	4.5 2.0
		1¼ DN32	2.50 64	1.0 0.5	—	—
2 DN50	x	¾ DN20	2.50 64	0.9 0.3	9.00 (sw) 229	2.0 0.9
		1 DN25	2.50 64	0.7 0.3	9.00 (sw) 229	2.3 1.0
		1¼ DN32	2.50 64	1.2 0.5	9.00 (sw) 229	4.6 2.1
		1½ DN40	2.50 64	1.0 0.5	3.50 89	1.1 0.5
2½	x	¾ DN20	+	1.3 0.6	+	3.3 1.5
		1 DN25	2.50 64	1.1 0.5	9.50 241	3.5 1.6
		1¼ DN32	3.50 89	3.3 1.5	3.50 89	1.4 0.6
		1½ DN40	2.50 64	3.6 1.6	9.50 (sw) 241	3.7 1.7
		2 DN50	2.50 64	3.9 1.8	3.50 89	4.3 2.0
3 DN80	x	¾ DN20	+	1.5 0.7	+	4.5 2.0
		1 DN25	2.50 64	1.3 0.6	9.50 (sw) 241	4.8 2.2
		1¼ DN32	2.50 64	1.4 0.6	+	4.8 2.2
		1½ DN40	2.50 64	5.1 2.3	9.50 (sw) 241	5.1 2.3
		2 DN50	2.50 64	1.6 0.7	3.50 89	6.0 2.7
		2½	2.50 64	1.8 0.8	3.50 89	7.0 3.2
		DN65	2.50 64	2.1 1.0	—	—
3½ DN90	x	3 DN80	2.50 64	2.0 0.9	9.50 (sw) 241	7.0 3.2
4 DN100	x	1 DN25	3.00 76	3.0 1.4	13.00 (sw) 330	6.5 2.9

Size			No. 50 Concentric Reducer		No. 51 Eccentric Reducer	
Nominal inches DN			E to E inches mm	Approx. Weight (Each) lb kg	E to E inches mm	Approx. Weight (Each) lb kg
		1¼ DN32	+	4.6 2.1	—	—
		1½ DN40	3.00 (sw) 76	2.6 1.2	10.00 (sw) 254	8.1 3.7
		2 DN50	3.00 76	2.4 1.1	4.00 102	3.3 1.5
		2½	3.00 76	2.7 1.2	4.00 102	3.4 1.5
		3 DN80	3.00 76	3.2 1.4	4.00 102	3.5 1.6
		3½ DN90	3.00 76	2.9 1.3	10.00 (sw) 254	8.0 3.6
5	x	2 DN50	11.00 (sw) 279	9.0 4.1	11.00 (sw) 279	5.2 2.4
		2½	4.00 102	4.3 2.0	11.00 (sw) 279	10.8 4.9
		3 DN80	4.00 102	5.5 2.5	11.00 (sw) 279	11.1 5.0
		4 DN100	3.50 89	4.3 1.9	5.00 127	12.0 5.4
6 DN150	x	1 DN25	4.00 102	5.0 2.3	11.50 (sw) 292	14.5 6.6
		1½ DN40	+	5.5 2.5	+	+
		2 DN50	4.00 102	6.6 3.0	11.50 (sw) 292	14.5 6.6
		2 ½	4.00 102	6.4 2.9	11.50 (sw) 292	14.2 6.4
		3 DN80	4.00 102	6.4 2.9	5.50 140	15.0 6.8
		4 DN100	4.00 102	6.5 2.9	5.50 140	17.0 7.7
		5	4.00 102	6.4 2.9	5.50 140	17.0 7.7
8 DN200	x	2½	16.00 406	7.9 3.6	12.00 (sw) 305	26.1 11.8
		3 DN80	5.00 127	9.3 4.2	12.00 (sw) 305	22.0 10.0
		4 DN100	5.00 127	10.4 4.8	12.00 (sw) 305	23.0 10.4
		5	5.00 127	11.6 5.2	12.00 (sw) 305	23.0 10.4
		6 DN150	5.00 127	11.9 5.4	6.00 152	24.0 10.9

4.15 DIMENSIONS (Continued)

Concentric/Eccentric Reducer

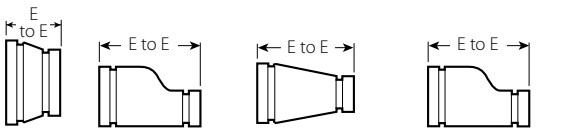
No. 50 Concentric
No. 51 Eccentric



No. 50 | No. 51 | Fabricated Steel No. 50 | Fabricated Steel No. 51

Size			No. 50 Concentric Reducer		No. 51 Eccentric Reducer	
Nominal inches DN			E to E inches mm	Approx. Weight (Each) lb kg	E to E inches mm	Approx. Weight (Each) lb kg
10 DN250	x	4 DN100	6.00 152	19.7 8.9	13.00 (sw) 330	32.0 14.5
		5	+	33.0 15.0	+	34.6 15.7
		6 DN150	6.00 152	20.0 9.1	13.00 (sw) 330	36.9 16.7
		8 DN200	6.00 152	22.0 10.0	7.00 178	21.6 9.8
12 DN300	x	4 DN100	+	44.0 20.0	14.00 (sw) 356	48.0 21.8
		6 DN150	7.00 178	24.6 11.2	14.00 (sw) 356	50.0 22.7
		8 DN200	7.00 178	52.0 23.6	14.00 (sw) 356	53.5 24.3
		10 DN250	7.00 178	39.0 17.7	14.00 (sw) 356	57.0 25.9
14[2] DN350	x	6 DN150	13.00 330	65.0 29.5	13.00 330	60.0 27.2
		8 DN200	13.00 330	65.0 29.5	13.00 330	60.0 27.2
		10 DN250	13.00 330	66.0 29.9	13.00 330	65.0 29.5
		12 DN300	13.00 330	68.0 30.8	13.00 330	66.0 29.9
16[2] DN400	x	8 DN200	14.00 356	73.0 33.1	14.00 355	73.0 33.1
		10 DN250	14.00 356	73.0 33.1	14.00 355	73.0 33.1
		12 DN300	14.00 356	73.0 33.1	14.00 355	73.0 33.1
		14 DN350	14.00 356	73.0 33.1	14.00 355	73.0 33.1
18[2] DN450	x	10 DN250	15.00 381	91.0 41.3	15.00 381	91.0 41.3
		12 DN300	15.00 381	91.0 41.3	15.00 381	91.0 41.3
		14 DN350	15.00 381	91.0 41.3	15.00 381	91.0 41.3
		16 DN400	15.00 381	91.0 41.3	15.00 381	91.0 41.3

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.



No. 50 | No. 51 | Fabricated Steel No. 50 | Fabricated Steel No. 51

Size			No. 50 Concentric Reducer		No. 51 Eccentric Reducer	
Nominal inches DN			E to E inches mm	Approx. Weight (Each) lb kg	E to E inches mm	Approx. Weight (Each) lb kg
20[2] DN500	x	10 DN250	20.00 508	110.0 49.9	20.00 508	177.0 80.3
		12 DN300	20.00 508	120.0 54.4	20.00 508	120.0 54.4
		14 DN350	20.00 508	149.0 67.9	20.00 508	149.0 67.9
		16 DN400	20.00 508	120.0 54.4	20.00 508	120.0 54.4
		18 DN450	20.00 508	136.0 61.7	20.00 508	136.0 61.7
24[2] DN600	x	10 DN250	20.00 508	142.0 64.4	20.00 508	142.0 64.4
		12 DN300	20.00 508	150.0 68.0	20.00 508	150.0 68.0
		14 DN350	20.00 508	162.0 73.5	20.00 508	162.0 73.5
		16 DN400	20.00 508	162.0 73.5	20.00 508	162.0 73.5
		18 DN450	20.00 508	162.0 73.5	20.00 508	162.0 73.5
		20 DN500	20.00 508	151.0 68.5	20.00 508	190.0 86.2
14 – 60 DN350 – DN1500			**For AGS fitting information, see** publication 20.05 AGS™			

[2] For 14"/DN350 and larger roll grooved systems, Victaulic offers the Advanced Groove System (AGS). For pricing and availability of cut groove fittings in this size, contact your nearest Victaulic sales representative.

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

+ Contact Victaulic for details.

NOTES

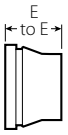
- Available with male threaded small end No. 52.
- Cast fitting available for JIS size. Contact Victaulic for details.
- Steel eccentric reducers available through 30"/DN750, contact Victaulic for dimensions.
- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

4.16 DIMENSIONS

Small Threaded Reducer

No. 52
No. 52F

No. 52



No 52F

Size			No. 52 Small Threader Reducer		No. 52F Concentric Reducer with BSPT Female Threaded End	
Nominal inches DN			E to E inches mm	Approx. Weight (Each) lb kg	E to E mm	Approx. Weight (Each) kg
1½ DN40	x	1 DN25	2.50 64	0.8 0.4	—	—
		1¼ DN32	2.50 64	0.9 0.4	—	—
2 DN50	x	¾ DN20	2.50 64	0.9 0.4	—	—
		1 DN25	2.50 64	0.7 0.3	—	—
		1 ¼ DN32	2.50 64	1.2 0.5	—	—
		1 ½ DN40	2.50 64	1.0 0.5	—	—
2½	x	1 DN25	2.50 64	1.1 0.5	—	—
		1¼ DN32	2.50 (sw) 64	1.2 0.5	—	—
		1½ DN40	2.50 (sw) 64	1.3 0.6	—	—
		2 DN50	2.50 64	1.4 0.6	—	—
DN65	x	1 ½ DN40	64	0.8	64	0.8
		2 DN50	—	—	64	0.9
3 DN80	x	¾ DN20	+(sw)	1.5 0.7	—	—
		1 DN25	2.50 64	1.3 0.6	—	—
		1 ¼ DN32	2.50 64	1.5 0.7	—	—
		1 ½ DN40	2.50 (sw) 64	1.5 0.7	—	—
		2 DN50	2.50 64	1.5 0.7	—	—
		2 ½	2.50 64	2.4 1.1	—	—
88.9mm	x	42.4mm	64	0.9	64	0.8
		48.3mm	64	0.9	64	0.9
		60mm	—	—	64	0.9

(s) = Carbon Steel Direct Roll Groove (OGS)
(sw) = Carbon Steel Segmentally Welded
+ Contact Victaulic for details.

No. 52

No 52F

Size			No. 52 Small Threader Reducer		No. 52F Concentric Reducer with BSPT Female Threaded End	
Nominal inches DN			E to E inches mm	Approx. Weight (Each) lb kg	E to E mm	Approx. Weight (Each) kg
4 DN100	x	1 DN25	3.00 76	2.3 1.0	—	—
		1½ DN40	3.00 76	2.7 1.2	—	—
		2 DN50	3.00 76	2.6 1.2	—	—
		2 ½	3.00 76	2.6 1.2	—	—
		3 DN80	3.00 76	2.5 1.1	—	—
108.0mm	x	42.4mm	76	1.3	76	1.3
		48.3mm	76	1.3	76	1.4
		60mm	—	—	76	1.4
114.3mm	x	42.4mm	76	1.3	76	1.3
		48.3mm	76	1.3	76	1.3
		60mm	76	1.3	76	1.4
5	x	4 DN100	+	4.5 2.0	—	—
133.0mm	x	60mm	—	—	114	2.2
139.0mm	x	60mm	—	—	114	2.3
6 DN150	x	1 DN25	4.00 102	5.5 2.5	—	—
		2 DN50	4.00 102	5.7 2.6	—	—
		2½	4.00 102	5.8 2.6	—	—
		3 DN80	4.00 102	5.8 2.6	—	—
		4 DN100	+(sw)	6.5 2.9	—	—
		5	+(sw)	2.0 0.9	—	—
159.0mm	x	42.4mm	114	2.2	144	2.5
		48.3mm	114	2.2	114	2.5
		60mm	—	—	114	2.6

4.16 DIMENSIONS (Continued)

Small Threaded Reducer

No. 52
No. 52F

No. 52

No 52F

Size			No. 52 Small Threader Reducer		No. 52F Concentric Reducer with BSPT Female Threaded End	
Nominal inches DN			E to E inches mm	Approx. Weight (Each) lb kg	E to E mm	Approx. Weight (Each) kg
165.1mm	x	42.4mm	102mm	2.4	102	2.9
		48.3mm	102mm	2.6	102	3.0
		60mm	—	—	102	3.0
8 DN200	x	2 DN50	16.00 406	1.5 0.7	—	—
		2 ½	16.00 406	1.7 0.8	—	—

(s) = Carbon Steel Direct Roll Groove (OGS)

(sw) = Carbon Steel Segmentally Welded

NOTES

- Available with British Standard Pipe Threads, specify “BSP” clearly on order.
- All fittings are ductile iron unless otherwise noted with an (sw) or (s).

5.0 PERFORMANCE

Flow Data

(Frictional Resistance)

The chart expresses the frictional resistance of various Victaulic fittings as equivalent feet of straight pipe. Fittings not listed can be estimated from the data given, for example, a 22½° elbow is approximately one-half the resistance of a 45° elbow. Values of mid-sizes can be interpolated.

Size		Dimensions					
		90° Elbows		45° Elbows		Tees	
Nominal inches DN	Actual Outside Diameter inches mm	No. 10 Std. Radius feet meters	No. 100 1 ½ D Long Radius feet meters	No. 11 Std. Radius feet meters	No. 110 1 ½ D Long Radius feet meters	Branch feet meters	Run feet meters
1 DN25	1.315 33.7	1.7 0.5	—	0.8 0.2	—	4.2 1.3	1.7 0.5
2 DN50	2.375 60.3	3.5 1.1	2.5 0.8	1.8 0.5	1.1 0.3	8.5 2.6	3.5 1.1
DN65	3.000 76.1	4.3 1.3	—	2.1 0.7	—	10.8 3.3	4.3 1.3
3 DN80	3.500 88.9	5.0 1.5	3.8 1.2	2.6 0.8	1.6 0.5	13.0 4.0	5.0 1.5
	4.250 108.0	6.4 2.0	—	3.2 0.9	—	15.3 4.7	6.4 2.0
4 DN100	4.500 114.3	6.8 2.1	5.0 1.5	3.4 1.0	2.1 0.6	16.0 4.9	6.8 2.1
	5.250 133.0	8.1 2.5	—	4.1 1.2	—	20.0 6.2	8.1 2.5
DN125	5.500 139.7	8.5 2.6	—	4.2 1.3	—	21.0 6.4	8.5 2.6
5	5.563 141.3	8.5 2.6	—	4.2 1.3	—	21.0 6.4	8.5 2.6
	6.250 159.0	9.4 2.9	—	4.9 1.5	—	25.0 7.6	9.6 2.9
	6.500 165.1	9.6 2.9	—	5.0 1.5	—	25.0 7.6	10.0 3.0
6 DN150	6.625 168.3	10.0 3.0	7.5 2.3	5.0 1.5	3.0 0.9	25.0 7.6	10.0 3.0
8 DN200	8.625 219.1	13.0 4.0	9.8 3.0	6.5 2.0	4.0 1.2	33.0 10.1	13.0 4.0
10 DN250	10.750 273.0	17.0 5.2	12.0 3.7	8.3 2.5	5.0 1.5	41.0 12.5	17.0 5.2
12 DN300	12.750 323.9	20.0 6.1	14.5 4.4	10.0 3.0	6.0 1.8	50.0 15.2	20.0 6.1
14 DN350	14.000 355.6	24.5[4] 7.5	15.8 4.8	18.5[4] 5.6	11.0 3.4	70.0 21.3	23.0 7.0
16 DN400	16.000 406.4	28.0[4] 8.5	18.0 5.5	21.0[4] 6.4	13.0 4.0	80.0 24.4	27.0 8.2
18 DN450	18.000 457.0	31.0[4] 9.5	20.0 6.1	23.5[4] 7.2	14.0 4.3	90.0 27.4	30.0 9.1
20 DN800	20.000 508.0	34.0[4] 10.4	22.5 6.9	25.5[4] 7.8	16.0 4.9	100.0 30.5	33.0 10.1
24 DN600	24.000 610.0	42.0[4] 12.8	27.0 8.2	29.5[4] 9.0	19.0 5.8	120.0 36.6	40.0 12.2
AGS fittings available up to 60"/DN1500. Contact Victaulic for details.							

[4] Fitting flow data for 14-24"/DN350-DN600 size No. 10 and No. 11 Elbows is based on fittings for Style 07 and 77 couplings. For flow data on AGS fittings (No. W10 and No. W11 Elbows), refer to publication 20.05.

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

Warranty

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

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07.01 1449 Rev AF Updated 08/2017

FireLock™ Installation-Ready™ Rigid Couplings
Style 009V, Style 009N and Style 109

10.64

Style 009V
Patented

Style 009N
Patented

Style 109
Patented

1.0 PRODUCT DESCRIPTION

Available Sizes

- Style 009V: 1 ¼ – 12"/DN32 – DN300
- Style 009N: 1 ¼ – 12"/DN32 – DN300
- Style 109: 1 ¼ – 4"/DN32 – DN100

Pipe Material

- Schedule 10, Schedule 40 or specialty carbon steel pipe listed in Section 5. For use with alternative materials and wall thicknesses please contact Victaulic
- For exceptions reference section 6.0 Notifications

Maximum Working Pressure

- Accommodates pressures ranging from full vacuum (29.9 in Hg/760 mm Hg) to 365 psi/2517 kPa
- Working pressure dependent on material, wall thickness and size of pipe

Function

- Joins carbon steel pipe with grooved ends conforming to publication 25.01
- Provides a rigid pipe joint designed to restrict axial or angular movement

Pipe Preparation

- Cut or roll grooved in accordance with publication 25.01: Victaulic Standard Groove Specifications.

2.0 CERTIFICATION/LISTINGS

LPS 1219: Issue 3.1
Cert/LPCB Ref. 104-1a/36

009N: G4090023
109: G421013

EN 10311
CPR (EU)
No. 305/2011

BS EN 10311
CPR (UK)
2019 No. 465

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

3.0 SPECIFICATIONS – MATERIAL

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.

Housing Coating: (specify choice)

- ☐ Orange coating
- ☐ Red coating (standard for EMEA-I and Asia Pacific)
- ☐ Optional for Style 009N and 009V: Galvanized per ASTM A123 (Hot Dipped) or ASTM A1059 (Thermo-Diffusion)
- ☐ Optional for Style 109: Mechanically Galvanized per ASTM B695 (available only in North America and Latin America).

Gasket: (specify choice)

- ☐ **Grade "E" EPDM (Type A) Vic-Plus™ Pre-lubricated Gasket**

  EPDM (Violet Color Code). Applicable for wet and dry (oil-free air) fire protection systems only. Listed/Approved for continuous use in wet and dry systems. Listed/Approved for dry systems at -40°F/-40°C and above. Not compatible for use with hot water services or steam services.

NOTES

- Reference should always be made to publication I-100, Victaulic Field Installation Handbook for gasket lubrication instructions.
- 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 publication 05.01, Victaulic Gasket Selection Guide for specific gasket service guidelines and for a listing of services which are not compatible.
- The gasket pre-lubrication will appear white to slightly amber in color. The color will not impact gasket or coupling performance.

Bolts/Nuts: (specify choice)

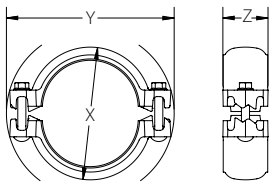
- ☐ Standard: Carbon steel oval neck track bolts meeting the mechanical property requirements of (imperial) ASTM A449 or (metric) ISO 898-1 Class 9.8 (M10-M16) or Class 8.8 (M20 and greater). Carbon steel hex nuts meeting the mechanical property requirements of (imperial hex nuts) ASTM A563 Grade B or (metric hex nuts) ISO 898-2 Class 10 (M12-M16) or Class 8 (M20 and greater). Track bolts and hex nuts are zinc electroplated per ASTM B633 Fe/Zn5 finish (imperial) Type III or (metric) Type II.
- ☐ Optional for Style 009N: Stainless steel oval neck track bolts meeting the requirements of ASTM F593, Group 2 (316 stainless steel), condition CW. Stainless steel Heavy Hex nuts meeting the requirements of ASTM F594, Group 2 (316 stainless steel), condition CW, with galling-resistant coating.[1]

[1] Optional bolts/nuts are available in imperial size only.

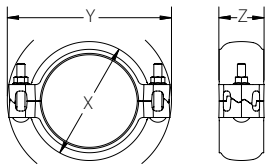
Coupling Linkage (Style 109 only): High Strength Steel with comparable physical properties to that of the Track Bolt (ASTM A449). Linkage is zinc electroplated per ASTM B633 Fe/Zn 5, Type III Finish.

4.0 DIMENSIONS

Style 009V Two-Bolt Installation-Ready Coupling



Style 009V Pre-Assembled



Style 009V Joint Assembled

Size		Maximum Working Pressure[2]	Maximum End Load[2]	Allow. Pipe End Separation[3]	Bolt/Nut		Dimensions					Approx. Weight (Each)
							Pre-Assembled		Joint Assembled			
Nominal inches DN	Actual Outside Diameter inches mm	Lbs. N	inches mm	psi kPa	Qty.	Size inches mm	X inches mm	Y inches mm	X inches mm	Y inches mm	Z inches mm	lb kg
1 ¼ DN32	1.660 42.4	365 2517	790 3514	0.10 2.54	2	⅜ x 2 M10 x 51	3.25 82	4.81 122	2.88 74	4.75 120	2.13 54	1.7 0.8
1 ½ DN40	1.900 48.3	365 2517	1035 4604	0.10 2.54	2	⅜ x 2 M10 x 51	3.50 88	5.06 128	3.13 80	5.00 128	2.13 54	1.7 0.8
2 DN50	2.375 60.3	365 2517	1617 7192	0.12 3.05	2	⅜ x 2 ½ M10 x 63	4.06 104	5.63 142	3.63 92	5.63 142	2.13 54	2.1 1.0
2 ½	2.875 73.0	365 2517	2370 10542	0.12 3.05	2	⅜ x 2 ½	4.56 116	6.06 154	4.06 104	6.06 154	2.13 54	2.2 1.0
3 DN80	3.500 88.9	365 2517	3512 15622	0.12 3.05	2	⅜ x 2 ½ M10 x 63	5.19 132	6.81 174	4.63 118	6.69 170	2.19 56	2.6 1.2
4 DN100	4.500 114.3	365 2517	5805 25822	0.17 4.32	2	⅜ x 2 ½ M10 x 63	6.38 162	7.94 202	5.75 146	7.75 196	2.25 58	3.5 1.6
6 DN150	6.625 168.3	365 2517	12582 55968	0.17 4.32	2	½ x 3 M12 x 76	9.00 228	10.69 272	8.31 212	10.56 268	2.31 58	6.3 2.9
8 DN200	8.625 219.1	365 2517	21326 94862	0.17 4.32	2	⅝ x 3 ⅝ M16 x 92	11.31 288	13.75 350	10.56 268	13.63 346	2.81 72	13.0 5.9
10 DN250	10.750 273.0	365 2517	33127 147358	0.25 6.4	2	⅞ x 6 M22 x 152	14.13 358	17.50 444	13.25 336	17.13 434	2.94 74	25.0 11.5
12 DN300	12.750 323.9	365 2517	46600 207290	0.25 6.4	2	⅞ x 6 M22 x 152	16.38 416	19.50 496	15.63 396	19.25 488	2.94 74	30.0 13.5

[2] Working Pressure and End Load are total, from all internal and external loads, based on standard weight (ANSI) steel pipe, standard roll or cut grooved in accordance with Victaulic specifications. See the Listings/Approvals section of this publication for ratings on other pipe.

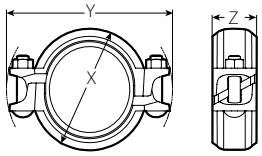
[3] The allowable pipe separation dimension shown is for system layout purposes only. Style 009V couplings are considered rigid connections and will not accommodate expansion or contraction of the piping system.

NOTES

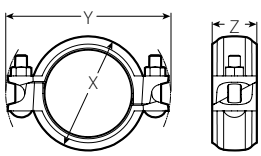
- When assembling Style 009V, Style 009N or Style 109 couplings onto end caps, take additional care to make certain the end cap is fully seated against the gasket end stop. For Style 009V, Style 009N couplings, use FireLock No. 006 end caps containing the "EZ" marking on the inside face or No. 60 end caps containing the "QV EZ" marking on the inside face. Non-Victaulic end cap products shall not be used with Style 009V, Style 009N or Style 109 couplings. IMPORTANT: Gaskets intended for the Style 009 or Style 009V couplings cannot be used with the Style 009N or Style 109 coupling. There is no interchanging of gaskets or housings between coupling styles.
- **Use Of FlushSeal Gaskets For Dry Pipe Systems** Style 009V, Style 009N or Style 109 couplings are supplied with Grade "E" Type A gaskets. These gaskets include an integral pipe stop, that once installed provides the similar benefits as a FlushSeal gasket for dry pipe systems. It should be noted that standard Victaulic FlushSeal gaskets cannot be used with the Style 009V, Style 009N or Style 109 couplings.
- The Allowable Pipe End Separation dimension shown is for system layout purposes only. Style 009V, Style 009N or Style 109 Installation-Ready rigid couplings are considered rigid connections and will not accommodate expansion/contraction or angular movement of the piping system. Contact Victaulic for torsional resistance information.

4.1 DIMENSIONS

Style 009N Two-Bolt *Installation-Ready* Coupling



Style 009N Pre-Assembled



Style 009N Joint Assembled

Size		Maximum Working Pressure[2]	Maximum End Load[2]	Allow. Pipe End Separation[3]	Bolt/Nut		Dimensions					Approx. Weight (Each)
							Pre-assembled		Joint Assembled			
Nominal inches DN	Actual Outside Diameter inches mm	psi kPa	lb N	inches mm	Qty.	Size inches mm	X inches mm	Y inches mm	X inches mm	Y inches mm	Z inches mm	lb kg
1¼ DN32	1.660 42.4	365 2517	790 3514	0.10 2.54	2	⅜ × 2 M10 x 51	3.13 79	5.00 127	2.75 70	5.00 127	2.00 51	1.4 0.6
1½ DN40	1.900 48.3	365 2517	1035 4604	0.10 2.54	2	⅜ × 2 M10 x 51	3.38 86	5.13 130	3.00 76	5.13 130	2.00 51	1.5 0.7
2 DN50	2.375 60.3	365 2517	1617 7193	0.12 3.05	2	⅜ × 2½ M10 x 63	4.00 102	5.63 143	3.50 89	5.63 143	2.00 51	1.9 0.9
2½	2.875 73.0	365 2517	2370 10542	0.12 3.05	2	⅜ × 2½ M10 x 63	4.50 114	6.13 156	4.00 102	6.13 156	2.00 51	2.1 1.0
DN65	3.000 76.1	365 2517	2580 11476	0.12 3.05	2	⅜ × 2½ M10 x 63	4.63 118	6.00 152	4.13 105	6.13 156	2.00 51	2.1 1.0
3 DN80	3.500 88.9	365 2517	3512 15622	0.12 3.05	2	⅜ × 2½ M10 x 63	5.13 130	6.75 171	4.63 117	6.75 171	2.00 51	2.3 1.0
4 DN100	4.500 114.3	365 2517	5805 25822	0.17 4.32	2	⅜ × 2½ M10 x 63	6.00 152	7.88 200	5.63 143	7.50 191	2.13 54	2.9 1.3
	4.250 108.0	365 2517	5178 23020	0.17 4.32	2	⅜ × 2½ M10 x 63	5.63 152	7.38 1.87	5.38 137	7.38 187	2.13 54	3.1 1.4
5	5.563 141.3	365 2517	8872 39456	0.17 4.32	2	½ × 3 M12 x 76	7.25 184	9.25 235	6.75 171	9.13 232	2.25 57	5.0 2.3
	5.250 133.0	365 2517	7901 35106	0.17 4.32	2	½ × 3 M12 x 76	6.63 168	9.00 229	6.38 162	9.00 229	2.25 57	4.8 2.2
DN125	5.500 139.7	365 2517	8672 38529	0.17 4.32	2	½ × 3 M12 x 76	6.88 175	9.25 235	6.75 171	9.13 232	2.25 57	4.9 2.2
6 DN150	6.625 168.3	365 2517	12582 44469	0.17 4.32	2	½ × 3¼ M12 x 83	8.38 213	10.38 264	7.88 200	10.13 257	2.25 57	6.0 2.7
	6.250 159.0	365 2517	11198 49753	0.17 4.32	2	½ × 3¼ M12 x 83	7.88 200	10.00 254	7.38 187	9.88 251	2.25 57	5.6 2.5
	6.500 165.1	365 2517	12112 53813	0.17 4.32	2	½ × 3¼ M12 x 83	8.00 203	10.25 260	7.75 197	10.13 257	2.25 57	6.0 2.7
8 DN200	8.625 219.1	365 2517	21326 94863	0.17 4.32	2	⅝ × 4 M16 x 101	10.88 276	13.38 340	10.25 260	13.13 333	2.50 64	11.4 5.2
	8.515 216.3	365 2517	20712 55968	0.17 4.32	2	⅝ × 4 M16 x 101	10.63 270	13.25 337	10.25 260	10.13 257	2.63 67	11.4 5.2
10 DN250	10.750 273.0	300 2068	27229 121121	0.25 6.4	2	⅞ × 6½ M22 x 165	13.75 349	17.00 432	13.25 337	17.13 435	2.75 70	22.6 10.3
12 DN300	12.750 323.9	300 2068	38303 170380	0.25 6.4	2	⅞ × 6½ M22 x 165	16.00 406	19.00 483	15.50 394	19.13 486	2.75 70	27.6 12.5

[2] Working Pressure and End Load are total, from all internal and external loads, based on standard weight (ANSI) steel pipe, standard roll or cut grooved in accordance with Victaulic specifications. See the Listings/Approvals section of this publication for ratings on other pipe.

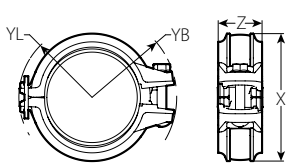
[3] The allowable pipe separation dimension shown is for system layout purposes only. Style 009N couplings are considered rigid connections and will not accommodate expansion or contraction of the piping system.

NOTES

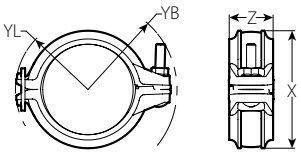
- When assembling Style 009V, Style 009N or Style 109 couplings onto end caps, take additional care to make certain the end cap is fully seated against the gasket end stop. For Style 009V, Style 009N couplings, use FireLock No. 006 end caps containing the "EZ" marking on the inside face or No. 60 end caps containing the "QV EZ" marking on the inside face. Non-Victaulic end cap products shall not be used with Style 009V, Style 009N or Style 109 couplings. IMPORTANT: Gaskets intended for the Style 009 or Style 009V couplings cannot be used with the Style 009N or Style 109 coupling. There is no interchanging of gaskets or housings between coupling styles.
- **Use Of FlushSeal Gaskets For Dry Pipe Systems** Style 009V, Style 009N or Style 109 couplings are supplied with Grade "E" Type A gaskets. These gaskets include an integral pipe stop, that once installed provides the similar benefits as a FlushSeal gasket for dry pipe systems. It should be noted that standard Victaulic FlushSeal gaskets cannot be used with the Style 009V, Style 009N or Style 109 couplings.
- The Allowable Pipe End Separation dimension shown is for system layout purposes only. Style 009V, Style 009N or Style 109 Installation-Ready rigid couplings are considered rigid connections and will not accommodate expansion/contraction or angular movement of the piping system. Contact Victaulic for torsional resistance information.

4.2 DIMENSIONS

Style 109 One-Bolt *Installation-Ready* Coupling



Style 109 Pre-Assembled



Style 109 Joint Assembled

Size		Max. Working Pressure	Max. End Load	Allow. Pipe End Sep. Maximum	Bolt/Nut		Dimensions								Weight
							Pre-Assembled				Assembled				
Nominal inches DN	Actual Outside Diameter inches mm	psi kPa	Lbs. N	inches mm	Qty.	Size inches mm	YL inches mm	YB inches mm	X inches mm	Z inches m m	YL inches mm	YB inches mm	X inches mm	Z inches mm	Approx. (Each) lb kg
1 ¼ DN32	1.660 42.4	365 2517	790 3514	0.10 2.54	1	⅜ x 2 ¼ M10 x 57	1.97 50	2.49 63	3.17 81	1.95 50	1.93 49	2.59 66	2.84 72	1.95 50	1.5 0.7
1 ½ DN40	1.900 48.3	365 2517	1035 4603	0.10 2.54	1	⅜ x 2 ¼ M10 x 57	2.13 54	2.60 66	3.41 87	1.95 50	2.1 53	2.68 68	3.07 78	1.95 50	1.6 0.7
2 DN50	2.375 60.3	365 2517	1617 7192	0.12 3.048	1	⅜ x 2 ¼ M10 x 57	2.32 59	2.85 72	3.76 96	1.98 50	2.29 58	2.95 75	3.45 88	1.98 50	1.9 0.9
2 ½	2.875 73.0	365 2517	2370 10540	0.12 3.048	1	⅜ x 2 ¼ M10 x 57	2.63 67	3.09 78	4.29 109	1.99 51	2.61 66	3.15 80	3.93 100	1.99 51	2.1 1.0
DN65	3.000 76.1	365 2517	2580 11476	0.12 3.048	1	7⁄16 x 2 ¾ M11 x 69	2.68 68	3.22 82	4.56 116	2.03 52	2.64 67	3.45 88	4.22 107	2.03 52	2.4 1.1
3 DN80	3.500 88.9	365 2517	3512 15620	0.12 3.048	1	7⁄16 x 2 ¾ M11 x 69	2.93 74	3.53 90	5.13 130	2.07 53	2.89 73	3.78 96	4.67 119	2.07 53	2.7 1.2
4 DN100	4.500 114.3	300 2068	4771 21223	0.17 4.318	1	7⁄16 x 2 ¾ M11 x 69	3.47 88	4.01 102	6.03 153	2.08 53	3.43 87	4.22 107	5.56 141	2.08 53	3.5 1.6

[4] Working Pressure and End Load are total, from all internal and external loads, based on standard weight (ANSI) steel pipe, standard roll or cut grooved in accordance with Victaulic specifications. See the Listings/Approvals section of this publication for ratings on other pipe.

[5] The allowable pipe separation dimension shown is for system layout purposes only. Style 109 couplings are considered rigid connections and will not accommodate expansion or contraction of the piping system.

NOTES

- When assembling Style 009V, Style 009N or Style 109 couplings onto end caps, take additional care to make certain the end cap is fully seated against the gasket end stop. For Style 009V, Style 009N couplings, use FireLock No. 006 end caps containing the "EZ" marking on the inside face or No. 60 end caps containing the "QV EZ" marking on the inside face. Non-Victaulic end cap products shall not be used with Style 009V, Style 009N or Style 109 couplings. IMPORTANT: Gaskets intended for the Style 009 or Style 009V couplings cannot be used with the Style 009N or Style 109 coupling. There is no interchanging of gaskets or housings between coupling styles.
- **Use Of FlushSeal Gaskets For Dry Pipe Systems** Style 009V, Style 009N or Style 109 couplings are supplied with Grade "E" Type A gaskets. These gaskets include an integral pipe stop, that once installed provides the similar benefits as a FlushSeal gasket for dry pipe systems. It should be noted that standard Victaulic FlushSeal gaskets cannot be used with the Style 009V, Style 009N or Style 109 couplings.
- The Allowable Pipe End Separation dimension shown is for system layout purposes only. Style 009V, Style 009N or Style 109 Installation-Ready rigid couplings are considered rigid connections and will not accommodate expansion/contraction or angular movement of the piping system. Contact Victaulic for torsional resistance information.

5.0 PERFORMANCE

Style 009V Two-Bolt Installation-Ready Coupling Listings/Approvals

Size		cULus		FM	
Nominal inches DN	Actual Outside Diameter inches mm	Sch. 10 psi kPa bar	Sch. 40 psi kPa bar	Sch. 10 psi kPa bar	Sch. 40 psi kPa bar
1 ¼ DN32	1.660 42.4	365 2516 25	365 2516 25	365 2515 25	365 2515 25
1 ½ DN40	1.900 48.3	365 2516 25	365 2516 25	365 2515 25	365 2515 25
2 DN50	2.375 60.3	365 2516 25	365 2516 25	365 2515 25	365 2515 25
2 ½	2.875 73.0	365 2516 25	365 2516 25	365 2515 25	365 2515 25
3 DN80	3.500 88.9	365 2516 25	365 2516 25	365 2515 25	365 2515 25
4 DN100	4.500 114.3	365 2516 25	365 2516 25	365 2515 25	365 2515 25
6 DN150	6.625 168.3	300 2068 20	365 2516 25	300 2065 20	365 2515 25
8 DN200	8.625 219.1	300[14] 2068[14] 20[14]	365 2516 25	300[13] 2065[13] 20[13]	365 2515 25
10 DN250	10.750 273.0	300[14] 2068[14] 20[14]	365 2516 25	300[13] 2065[13] 20[13]	365 2515 25
12 DN300	12.750 323.9	300[14] 2068[14] 20[14]	365 2516 25	300[13] 2065[13] 20[13]	365 2515 25

6 Listed/Approved for continuous use in wet and dry systems. Listed/Approved for dry systems -40° F/C and above. Please see the Victaulic InstallationManual I-009V for details concerning when supplemental lubrication is required.

8 FM approved for BS 1387 (EN 10255) Medium 3.6 mm pipe wall.

9 cULus listed for EN 10220 4.0 mm pipe wall.

10 cULus listed for EN 10255 4.5 mm pipe wall.

13 FM approved for 0.188" pipe wall.

14 cULus listed for 0.188" pipe wall.

15 cULus listed for JIS G3452 5.8mm pipe wall.

5.1 PERFORMANCE

Specialty Pipe
Style 009V Two-Bolt Installation-Ready Coupling Listings/Approvals

Pipe Type	Size	Pressure Rating	Pressure Rating
	inches DN	UL psi kPa bar	FM psi kPa bar
EF	1 ¼ – 4 DN32 – DN100	300 2068 20	300 2065 20
EL	1 ¼ – 2 DN32 – DN50	–	300 2065 20
MF	1 ¼ – 6 DN32 – DN150	300 2068 20	300 2065 20
FF	1 ½ – 4 DN40 – DN100	300 2068 20	300 2065 20
HF	1 ¼ – 4 DN32 – DN100	–	300 2065 20
	2 – 4 DN50 – DN100	300 2068 20	– – –
ET40	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2065 20
EZT	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2065 20
MT	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2065 20
MLT	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2065 20
Easy-Flow	1 ¼ – 4 DN32 – DN100	175 1206 12	300 2065 20
WG5, WG5E, WF5, WL7	1 ¼ – 4 DN32 – DN100	175 1206 12	–
WG7, WG7E	1 ¼ – 4 DN32 – DN100	175 1206 12	300 2065 20
WLS	1 ¼ – 2 DN32 – DN50	–	300 2065 20
GL	1 ¼ – 2 DN32 – DN50	–	300 2065 20

NOTES

- Easy Flow = Steel pipe manufactured by Borusan Mannesmann Boru
- EF = EDDY FLOW steel pipe manufactured by Bull Moose Tube Co.
- EL = EDDYLITE steel pipe manufactured by Bull Moose Tube Co.
- ET40 = Eddythread 40 steel pipe manufactured by Bull Moose Tube Co.
- EZF = EZ-Flow steel pipe manufactured by Northwest Pipe Co.
- EZT = EZ-Thread steel pipe manufactured by Youngstown Tube Co.
- FF = Fire-Flo steel pipe manufactured by Youngstown Tube Co.
- GL = GL steel pipe manufactured by Wheatland Tube Co.
- HF = Hydroflow sch 7 steel pipe manufactured by Nucor Tubular Products Inc.
- MF = Mega-Flow steel pipe manufactured by Wheatland Tube Co.
- MT = Mega-Thread steel pipe manufactured by Wheatland Tube Co.
- MLT = MLT steel pipe manufactured by Wheatland Tube Co
- WG5, WG5E, WF5 = WGalweld 5, WGalweld 5E, WFlow 5 steel pipe manufactured by Wuppermann Stahl GmbH.
- WG7, WG7E, WL7 = WGalweld 7, Wgalweld 7E, WLight 7 steel pipe manufactured by Wuppermann Stahl GmbH
- WLS = WLS steel pipe manufactured by Wheatland Tube Co.

5.2 PERFORMANCE

Style 009N Two-Bolt *Installation-Ready* Coupling Listings/Approvals[6]

The information provided below is based on the latest listing and approval data at the time of publication. Listings/Approvals are subject to change and/or additions by the approval agencies. Contact Victaulic for performance on other pipe and the latest listings and approvals.

Size		cULus		FM		VdS	LPCB
Nominal inches DN	Actual Outside Diameter inches mm	Sch. 10 psi kPa bar	Sch. 40 psi kPa bar	Sch. 10 psi kPa bar	Sch. 40 psi kPa bar	 psi kPa bar	 psi kPa bar
1 ¼ DN32	1.660 42.4	365 2516 25	365 2516 25	363 2503 25	363 2503 25	363 2503 25	363 2503 25
1 ½ DN40	1.900 48.3	365 2516 25	365 2516 25	363 2503 25	363 2503 25	363 2503 25	363 2503 25
2 DN50	2.375 60.3	365 2516 25	365 2516 25	363 2503 25	363 2503 25	363 2503 25	363 2503 25
2 ½	2.875 73.0	365 2516 25	365 2516 25	363 2503 25	363 2503 25	–	363 2503 25
DN65	3.000 76.1	365[7] 2516[7] 25[7]	–	363[8] 2503[8] 25[8]	–	363 2503 25	363 2503 25
3 DN80	3.500 88.9	365 2516 25	365 2516 25	363 2503 25	363 2503 25	363 2503 25	363 2503 25
4 DN100	4.500 114.3	365 2516 25	365 2516 25	363 2503 25	363 2503 25	363 2503 25	363 2503 25
	4.250 108.0	–	–	363 2503 25	363 2503 25	–	–
5	5.563 141.3	365 2516 25	365 2516 25	363 2503 25	363 2503 25	232 1600 16	363 2503 25
	5.250 133.0	–	–	363[8] 2503[8] 25[8]	–	–	–
DN125	5.500 139.7	290[9] 1999[9] 20[9]	–	363[8] 2503[8] 25[8]	–	232 1600 16	363 2503 25
6 DN150	6.625 168.3	300 2068 20	365 2516 25	300 2068 20	363 2503 25	232 1600 16	363 2503 25
	6.250 159	–	–	363[8] 2503[8] 25[8]	–	–	–

6 Listed/Approved for continuous use in wet and dry systems. Listed/Approved for dry systems -40° F/C and above. Please see the Victaulic InstallationManual I-109 for details concerning when supplemental lubrication is required.

7 cULus listed for DIN 2458 (EN 10220) 2.6 mm pipe wall.

8 FM approved for BS 1387 (EN 10255) Medium 3.6 mm pipe wall.

9 cULus listed for EN 10220 4.0 mm pipe wall.

10 cULus listed for EN 10255 4.5 mm pipe wall.

11 With optional stainless steel fasteners, cULus Listed to 175psi/1207 kPa/12 bar and FM Approved to the FM ratings shown in the above table. The stainless steel fasteners have a marking designation of "316" on the end face of the bolt.

12 cUL listed to 250 psi/1720 kPa /17 bar.

13 FM approved for 0.188" pipe wall.

14 cULus listed for 0.188" pipe wall.

15 cULus Listed for JIS G3452 pipe.

5.2 PERFORMANCE (CONTINUED)

Style 009N Two-Bolt *Installation-Ready* Coupling Listings/Approvals[6]

The information provided below is based on the latest listing and approval data at the time of publication. Listings/Approvals are subject to change and/or additions by the approval agencies. Contact Victaulic for performance on other pipe and the latest listings and approvals.

Size		cULus		FM		VdS	LPCB
Nominal inches DN	Actual Outside Diameter inches mm	Sch. 10 psi kPa bar	Sch. 40 psi kPa bar	Sch. 10 psi kPa bar	Sch. 40 psi kPa bar	 psi kPa bar	 psi kPa bar
	6.500 165.1	290[10] 1999[10] 20[10]	–	363[8] 2503[8] 25[8]	–	–	363 2503 25
8 DN200	8.625 219.1	300[14] 2068[14] 20[14]	365 2516 25	300[13] 2068[13] 20[13]	363 2503 25	232 1600 16	363 2503 25
	8.515 216.3	290 1999 20	–	363[8] 2503[8] 25[8]	–	–	–
10 DN250	10.750 273.0	300[14] 2068[14] 20[14]	300 2068 20	300[13] 2068[13] 20[13]	300 2068 20	–	290 2000 20
12 DN300	12.750 323.9	300[12 14] 2068[12 14] 20[12 14]	300 2068 20	250[13] 1720[13] 17[13]	300 2068 20	–	290 2000 20

6 Listed/Approved for continuous use in wet and dry systems. Listed/Approved for dry systems -40° F/C and above. Please see the Victaulic InstallationManual I-109 for details concerning when supplemental lubrication is required.

7 cULus listed for DIN 2458 (EN 10220) 2.6 mm pipe wall.

8 FM approved for BS 1387 (EN 10255) Medium 3.6 mm pipe wall.

9 cULus listed for EN 10220 4.0 mm pipe wall.

10 cULus listed for EN 10255 4.5 mm pipe wall.

11 With optional stainless steel fasteners, cULus Listed to 175psi/1207 kPa/12 bar and FM Approved to the FM ratings shown in the above table. The stainless steel fasteners have a marking designation of "316" on the end face of the bolt.

12 cUL listed to 250 psi/1720 kPa /17 bar.

13 FM approved for 0.188" pipe wall.

14 cULus listed for 0.188" pipe wall.

15 cULus Listed for JIS G3452 pipe.

5.3 PERFORMANCE

Specialty Pipe
Style 009N Two-Bolt *Installation-Ready* Coupling Listings/Approvals

Pipe Type	Size inches DN	Pressure Rating UL psi kPa bar	Pressure Rating FM psi kPa bar
EF	1 ¼ – 4 DN32 – DN100	300 2068 20	–
EL	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
EZF	3-4 DN80 – DN100	300 2068 20	–
MF	1 ¼ – 4 DN32 – DN100	300 2068 20	300 2068 20
	6 DN150	175 1206 12	175 1207 12
FF	1 ½ – 4 DN40 – DN100	300 2068 20	–
ET40	1 ¼ – 2 DN32 – DN50	300 2068 20	–
EZT	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
MT	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
MLT	1 ¼ – 2 DN32 – DN50	–	300 2068 20
Easy Flow	1 ¼ – 4 DN32 – DN100	–	300 2068 20
WG5, WG5E, WF5, WG7, WG7E,WL7	1 ¼ – 4 DN32 – DN100	300 2068 24	300 2068 20
TF (Tex-Flow)	2 ½ – 4 DN65 - DN100	–	300 2068 20
WLS	1 ¼ – 2 DN32 – DN50	–	300 2068 20
GL	1 ¼ – 2 DN32 – DN50	–	300 2068 20

NOTES

- Easy Flow = Steel pipe manufactured by Borusan Mannesmann Boru
- EF = EDDY FLOW steel pipe manufactured by Bull Moose Tube Co.
- EL = EDDYLITE steel pipe manufactured by Bull Moose Tube Co.
- ET40 = Eddythread 40 steel pipe manufactured by Bull Moose Tube Co.
- EZF = EZ-Flow steel pipe manufactured by Northwest Pipe Co.
- EZT = EZ-Thread steel pipe manufactured by Youngstown Tube Co.
- FF = Fire-Flo steel pipe manufactured by Youngstown Tube Co.
- GL = GL steel pipe manufactured by Wheatland Tube Co.
- MF = Mega-Flow steel pipe manufactured by Wheatland Tube Co.
- MT = Mega-Thread steel pipe manufactured by Wheatland Tube Co.
- MLT = MLT steel pipe manufactured by Wheatland Tube Co
- TF = Tex-Flow steel pipe manufactured by Tex-Tube Co.
- WG5, WG5E, WF5 = WGalweld 5, WGalweld 5E, WFlow 5 steel pipe manufactured by Wuppermann Stahl GmbH.
- WG7, WG7E, WL7 = WGalweld 7, Wgalweld 7E, WLight 7 steel pipe manufactured by Wuppermann Stahl GmbH
- WLS = WLS steel pipe manufactured by Wheatland Tube Co.

5.4 PERFORMANCE

Style 109 One-Bolt *Installation-Ready* Coupling Listings/Approvals[15]

The information provided below is based on the latest listing and approval data at the time of publication. Listings/Approvals are subject to change and/or additions by the approvals agencies. Contact Victaulic for performance on other pipe and the latest listings and approvals.

Size		cULus		FM		VdS	LPCB
Nominal inches DN	**Actual Outside Diameter** inches mm	**Sch. 10** psi kPa bar	**Sch. 40** psi kPa bar	**Sch. 10** psi kPa bar	**Sch. 40** psi kPa bar	 psi kPa bar	 psi kPa bar
1 ¼ DN32	1.660 42.4	365 2516 25	365 2516 25	365 2517 25	365 2517 25	232 1600 16	363 2503 25
1 ½ DN40	1.900 48.3	365 2516 25	365 2516 25	365 2517 25	365 2517 25	232 1600 16	363 2503 25
2 DN50	2.375 60.3	365 2516 25	365 2516 25	365 2517 25	365 2517 25	232 1600 16	363 2503 25
2 ½	2.875 73.0	365 2516 25	365 2516 25	365 2517 25	365 2517 25	–	–
DN65	3.000 76.1	–	–	365 2517 25	365 2517 25	232 1600 16	363 2503 25
3 DN80	3.500 88.9	365 2516 25	365 2516 25	365 2517 25	365 2517 25	232 1600 16	363 2503 25
4 DN100	4.500 114.3	300 2068 20	300 2068 20	300 2068 20	300 2068 20	–	290 2000 20

[15] Listed/Approved for continuous use in wet and dry systems. Listed/Approved for dry systems -40° F/C and above. Please see the Victaulic Installation Manual I-109 for details concerning when supplemental lubrication is required.

NOTE

- With optional stainless steel fasteners, cULus Listed to 300 psi/2068 kPa/20.6 bar and FM Approved to the FM ratings shown in the above table. The stainless steel fasteners have a marking designation of "316" on the head of the bolt.

5.5 PERFORMANCE

Specialty Pipe
Style 109 One-Bolt *Installation-Ready* Coupling Listings/Approvals

Pipe Type	Size inches DN	Pressure Rating cULus psi kPa bar	 FM psi kPa bar
EF	1 ¼ – 2 ½ DN32 – 73.0 mm	–	300 2068 20
	1 ½ – 2 ½ DN40 – 73.0 mm	300 2068 20	–
	3 – 4 DN80 – DN100	300 2068 20	300 2068 20
Easy Flow	1 ¼ – 2 DN32 – DN50	–	300 2068 20
	3 – 4 DN80 – DN100	–	300 2068 20
EL	1 ¼ – 2 DN32 – DN50	–	300 2068 20
ET40	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
EZT	1 ¼ – 2 DN32 – DN50	–	300 2068 20
	1 ½ – 2 DN40 – DN50	300 2068 20	–
FF	1 ½ – 4 DN40 – DN100	300 2068 20	300 2068 20
GL	1 ¼ – 2 DN32 – DN50	–	300 2068
MF	1 ¼ – 4 DN32 – DN100	300 2068 20	300 2068 20
MT	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
MLT	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20

NOTES

- EF = EDDY FLOW steel pipe manufactured by Bull Moose Tube Co.
- Easy Flow = Easy Flow steel pipe manufactured by Borusan Mannesmann Boru.
- EL = EDDYLITE steel pipe manufactured by Bull Moose Tube Co.
- ET40 = Eddythread 40 steel pipe manufactured by Bull Moose Tube Co.
- EZT = EZ-Thread steel pipe manufactured by Youngstown Tube Co.
- FF = Fire-Flo steel pipe manufactured by Youngstown Tube Co.
- GL = GL steel pipe manufactured by Wheatland Tube Co.
- MF = Mega-Flow steel pipe manufactured by Wheatland Tube Co.
- MT = Mega-Thread steel pipe manufactured by Wheatland Tube Co.
- MLT = MLT steel pipe manufactured by Wheatland Tube Co.
- TF = Tex-Flow steel pipe manufactured by Tex-Tube Co.
- WG5, WG5E, WF5 = WGalweld 5, WGalweld 5E, and WFlow 5 steel pipe manufactured by Wuppermann Stahl GmbH
- WG7, WG7E, WL7 = WGalweld 7, WGalweld 7E, and WLight 7 steel pipe manufactured by Wuppermann Stahl GmbH.
- WLS = WLS steel pipe manufactured by Wheatland Tube Co.

5.5 PERFORMANCE (CONTINUED)

Specialty Pipe
Style 109 One-Bolt *Installation-Ready* Coupling Listings/Approvals

Pipe Type	Size inches DN	Pressure Rating cULus psi kPa bar	Pressure Rating FM psi kPa bar
TF	2½ – 4 73.00 mm – DN100	–	300 2068 20
WG5, WG5E, WF5, WL7	1¼ – 4 DN32 – DN100	300 2068 20	–
WG7, WG7E	1¼ – 4 DN32 – DN100	300 2068 20	300 2068 20
WLS	1¼ – 2 DN32 – DN50	–	300 2068 20

NOTES

- EF = EDDY FLOW steel pipe manufactured by Bull Moose Tube Co.
- Easy Flow = Easy Flow steel pipe manufactured by Borusan Mannesmann Boru.
- EL = EDDYLITE steel pipe manufactured by Bull Moose Tube Co.
- ET40 = Eddythread 40 steel pipe manufactured by Bull Moose Tube Co.
- EZT = EZ-Thread steel pipe manufactured by Youngstown Tube Co.
- FF = Fire-Flo steel pipe manufactured by Youngstown Tube Co.
- GL = GL steel pipe manufactured by Wheatland Tube Co.
- MF = Mega-Flow steel pipe manufactured by Wheatland Tube Co.
- MT = Mega-Thread steel pipe manufactured by Wheatland Tube Co.
- MLT = MLT steel pipe manufactured by Wheatland Tube Co.
- TF = Tex-Flow steel pipe manufactured by Tex-Tube Co.
- WG5, WG5E, WF5 = WGalweld 5, WGalweld 5E, and WFlow 5 steel pipe manufactured by Wuppermann Stahl GmbH
- WG7, WG7E, WL7 = WGalweld 7, WGalweld 7E, and WLight 7 steel pipe manufactured by Wuppermann Stahl GmbH.
- WLS = WLS steel pipe manufactured by Wheatland Tube Co.

6.0 NOTIFICATIONS

⚠ WARNING

- **Read and understand all instructions before attempting to install any Victaulic products.**
- **Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.**
- **Wear safety glasses, hardhat, and foot protection.**

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

- **These products shall be used only in fire protection systems that are designed and installed in accordance with current, applicable National Fire Protection Association (NFPA 13, 13D, 13R, etc.) standards, or equivalent standards, and in accordance with applicable building and fire codes. These standards and codes contain important information regarding protection of systems from freezing temperatures, corrosion, mechanical damage, etc.**
- **The installer shall understand the use of this product and why it was specified for the particular application.**
- **The installer shall understand common industry safety standards and potential consequences of improper product installation.**
- **It is the system designer's responsibility to verify suitability of materials for use with the intended fluid media within the piping system and external environment.**
- **The material specifier shall evaluate the effect of chemical composition, pH level, operating temperature, chloride level, oxygen level, and flow rate on materials to confirm system life will be acceptable for the intended service.**

Failure to follow installation requirements and local and national codes and standards could compromise system integrity or cause system failure, resulting in death or serious personal injury and property damage.

NOTICE

- **Victaulic does not recommend the use of any furnace butt-welded pipe with sizes 2"/DN50 and smaller Victaulic gasketed joint products. This includes, but is not limited to, ASTM A53 Type F pipe.**

NOTE

- If using coated pipe, please refer to the installation instructions for pipe preparation details.

7.0 REFERENCE MATERIALS

05.01: Seal Selection Guide

25.01: Original Groove System (OGS) Groove Specifications

I-009N: Installation Instructions FireLock EZ™ Rigid Coupling Style 009N

I-009V: Installation Instructions FireLock™ Installation-Ready™ Rigid Coupling Style 009V

I-100: Victaulic Field Installation Handbook

I-109: Installation Instructions FireLock™ One-Bolt Rigid Coupling Style 109

I-ENDCAP: Victaulic End Caps Installation Instructions

I-IMPACT: Impact Tool Usage Guidelines

PATRIOT FIRE PROTECTION, INC.

Fire Sprinklers Save Lives!

2707 70TH Avenue East
Tacoma, WA 98424

TEL: (253) 926.2290
FAX: (253) 922.6150

SPRINKLERS AND ACCESSORIES

HANFORD, WA OFFICE
TEL (509) 373.8895
FAX (509) 373.8919

VANCOUVER, WA OFFICE
TEL (360) 699.4403
PORTLAND (503) 222.6001
FAX (360) 699.4485

SPOKANE, WA OFFICE
TEL (509) 926.3428
FAX (509) 926.3708

Reliable®

Model 041 U Bolt Threaded Mechanical Tee FNPT

cULus Listed, FM Approved
300 psi (20.7 bar)

041 U Bolt Threaded Mechanical Tee FNPT Technical Data

Operating Specifications
Maximum Working Pressure:
300 psi (20.7 bar)
Operating Temperature
-30 °F to 230 °F (-34 °C to 110 °C)

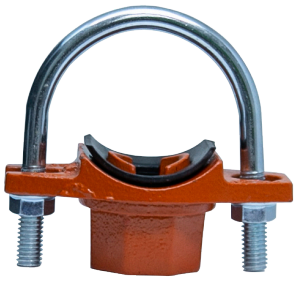
Material Specifications
Housings: ASTM A536 Grade 65-45-12 Ductile Iron
Gasket: Grade E EDPM

Bolt Specification:
SAE J429 Grade 5

Thread Specification:
ASME B1.20.1

Available Finishes
Housing:
Standard orange paint
Hot dipped galvanized (ASTM A-153)

Listings and Approvals
cULus Listed
FM Approved



041 U Bolt Threaded Mechanical Tee FNPT Dimensions

Figure 1

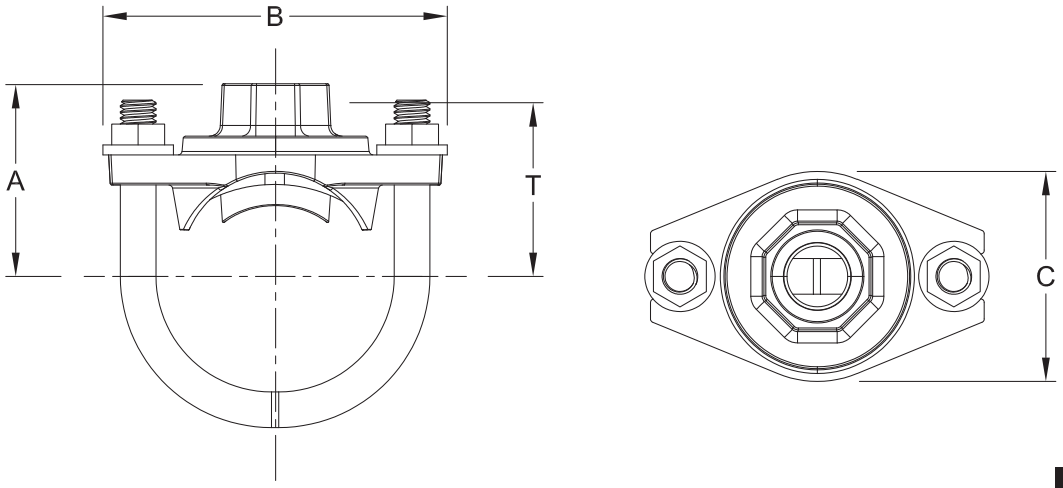


Table A

Nominal Size		Hole Saw Size in (mm)	Bolt Size in	Bolt Torque lbs-ft / N-M	Dimensions				Weight lb (kg)
Run Pipe in (mm)	Threaded Outlet in (mm)				A in/mm	B in/mm	C in/mm	Take Out T in/mm	
1-1/4 (32)	1/2 (15)	1-3/16 (30)	3/8	22-29 (30-40)	2-1/8 (53)	3-1/2 (89)	2-3/16 (56)	1-3/4 (44)	0.90 (0.41)
	3/4 (20)	1-3/16 (30)	3/8	22-29 (30-40)	2-1/8 (53)	3-1/2 (89)	2-3/16 (56)	1-3/4 (44)	0.95 (0.43)
	1 (25)	1-3/16 (30)	3/8	22-29 (30-40)	2-3/16 (56)	3-1/2 (89)	2-3/16 (56)	1-7/8 (47)	0.95 (0.43)
1-1/2 (40)	1/2 (15)	1-3/16 (30)	3/8	22-29 (30-40)	2-3/16 (55)	3-1/2 (89)	2-3/16 (56)	1-13/16 (46)	0.90 (0.41)
	3/4 (20)	1-3/16 (30)	3/8	22-29 (30-40)	2-3/16 (55)	3-1/2 (89)	2-3/16 (56)	1-13/16 (46)	0.93 (0.42)
	1 (25)	1-3/16 (30)	3/8	22-29 (30-40)	2-1/4 (58)	3-1/2 (89)	2-3/16 (56)	1-15/19 (49)	0.99 (0.45)
2 (50)	1/2 (15)	1-3/16 (30)	3/8	22-29 (30-40)	2-1/2 (64)	3-7/8 (98)	2-3/16 (56)	2-1/16 (53)	0.93 (0.42)
	3/4 (20)	1-3/16 (30)	3/8	22-29 (30-40)	2-1/2 (64)	3-7/8 (98)	2-3/16 (56)	2-1/16 (53)	0.97 (0.44)
	1 (25)	1-3/16 (30)	3/8	22-29 (30-40)	2-5/8 (67)	3-7/8 (98)	2-3/16 (56)	2-3/16 (56)	0.97 (0.44)
2-1/2 (65)	1/2 (15)	1-3/16 (30)	3/8	22-29 (30-40)	2-3/4 (69)	4-3/8 (111)	2-3/16 (56)	2-1/4 (58)	1.28 (0.58)
	3/4 (20)	1-3/16 (30)	3/8	22-29 (30-40)	2-3/4 (69)	4-3/8 (111)	2-3/16 (56)	2-1/4 (58)	1.28 (0.58)
	1 (25)	1-3/16 (30)	3/8	22-29 (30-40)	2-13/16 (72)	4-3/8 (111)	2-3/16 (56)	2-3/8 (61)	1.32 (0.60)
3 (80)	1 (25)	1-3/16 (30)	3/8	22-29 (30-40)	3-3/16 (81)	5-1/16 (128)	2-3/16 (56)	2-5/8 (67)	1.32 (0.60)

041 Pipe Compatibility

Table B

Nominal Size in (mm)	Pipe	Approvals
1-1/4 (32)	10	cULus, FM
	40	
1-1/2 (40)	10	cULus, FM
	40	
2 (50)	10	cULus, FM
	40	
2-1/2 (65)	10	cULus, FM
	40	
3 (80)	10	cULus, FM
	40	

P/N 999997065

Reliable®

Model KFR56 Series Sprinklers

Quick-response, Standard Spray Fusible Link Sprinklers

K5.6 (80 metric)
cULus Listed, FM Approved, VdS Approved, CE Certified

Product Description

Model KFR56 series sprinklers are standard spray, quick-response sprinklers with a fusible link operating element. The sprinklers are cULus Listed, FM Approved, VdS Approved, and CE Certified. See Table C for available finishes. All KFR56 sprinklers have a nominal K-factor of 5.6 (80 metric).

Model KFR56 series sprinklers are available in Ordinary (165°F [74°C]) or Intermediate (212°F [100°C]) temperature classification. Model KFR56 Pendent sprinklers are available with Model F1, Model F2, or Model FP recessed escutcheons.

Application

Model KFR56 series sprinklers are listed and approved for installation in accordance with NFPA 13 and FM Loss Prevention Data Sheets. Follow requirements of NFPA 13 for Quick-response Standard Spray Sprinklers when installing Model KFR56 series sprinklers. FM Approvals classifies Model KFR56 sprinklers as K5.6 QR Non-storage and K5.6 QR In-rack Storage sprinklers.

Installation

Model KFR56 series sprinklers must be installed in accordance with the requirements of NFPA 13 or FM Property Loss Prevention Data Sheets. The Model F1, F2, and FP escutcheons are the only recessed escutcheons listed and approved for use with Model KFR56 Pendent sprinklers. The use of any other recessed escutcheon will void all approvals and warranties. Do not install Model FP escutcheons in ceilings that are positively pressurized with respect to the occupied space below.

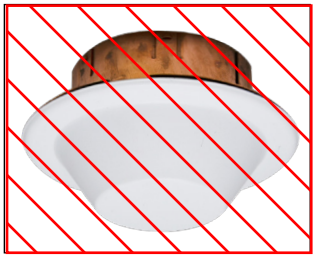
Use only the Model W2 sprinkler wrench for installing Model KFR56 series pendent, upright, and horizontal sidewall sprinklers, and use the Model W1 or W4 wrench for installing Model KFR56 series recessed pendent, conical concealed pendent (CCP), and recessed horizontal sidewall sprinklers. The use of wrenches other than those specified may damage these sprinklers.

Recommended installation torque is 14-20 ft-lbs (19 – 27 N·m). Do not tighten sprinklers over the maximum recommended torque. Exceeding the maximum recommended torque may cause leakage or impairment of the sprinklers.

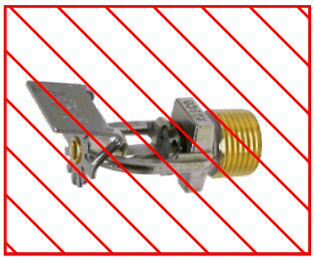
Important! Reliable fire sprinklers must be handled, stored, and installed in accordance with the guidelines in Caution Sheet 310 and this bulletin. Failure to follow these instructions may result in unintended operation or nonoperation of the fire protection system.

Model KFR56 Pendent

Model KFR56 Upright



Model CCP



Model KFR56 HSW

Listings & Approvals

Listed by Underwriters Laboratories, Inc. and UL Certified for Canada (cULus)
- Sprinklers, Automatic and Open (VNIV)

FM Approved (FM)
- K5.6 QR Non-storage
- K5.6 QR In-rack Storage

VdS Approved and CE Certified to EN12259
UKCA: 0832-UKCA-CPR-S5073, -5074, -5075

Model KFR Series Sprinkler Summary — **Table A**

Sprinkler Model	Orientation	Listing or Approval	Max. Working Pressure psi (bar)	Sprinkler Identification Number (SIN)
KFR56 Pendent	Pendent	cULus	250 (17.2)	RA3614
		FM, VdS, CE, UKCA	175 (12)	
KFR56 Upright KFR56 Upright Intermediate	Upright	cULus	250 (17.2)	RA3624
		FM, VdS, CE, UKCA	175 (12)	
KFR56 HSW	HSW	cULus	250 (17.2)	RA3634
		FM, VdS, CE, UKCA	175 (12)	

Model KFR56 Pendent sprinkler — SIN RA3614

Technical Specifications
Style: Pendent, Recessed Pendent, or Conical Concealed Pendent
Threads: 1/2" NPT or ISO7-1R1/2
Nominal K-Factor: 5.6 (80 metric)
Max. Working Pressure:
cULus: 250 psi (17.2 bar)
FM, VdS, CE: 175 psi (12 bar)

Material Specifications
Thermal Sensor: Beryllium Nickel
Strut and Lever: Stainless Steel
Roto-clip: Stainless Steel
Sprinkler Frame: Brass Alloy
Cap: Bronze Alloy
Sealing Washer: Nickel with PTFE
Load Screw: Copper Alloy
Deflector: Brass Alloy

Sprinkler Wrenches
Model W2 (non-recessed)
Model W1 or W4 (recessed & concealed)
Model W14 (with guard installed)

Listings and Approvals
cULus Listed
FM Approved
VdS Approved
CE Certificate of constancy of performance
0786-CPR40313
UKCA: 0832-UKCA-CPR-S5074

Sprinkler Finishes
(See Table C)

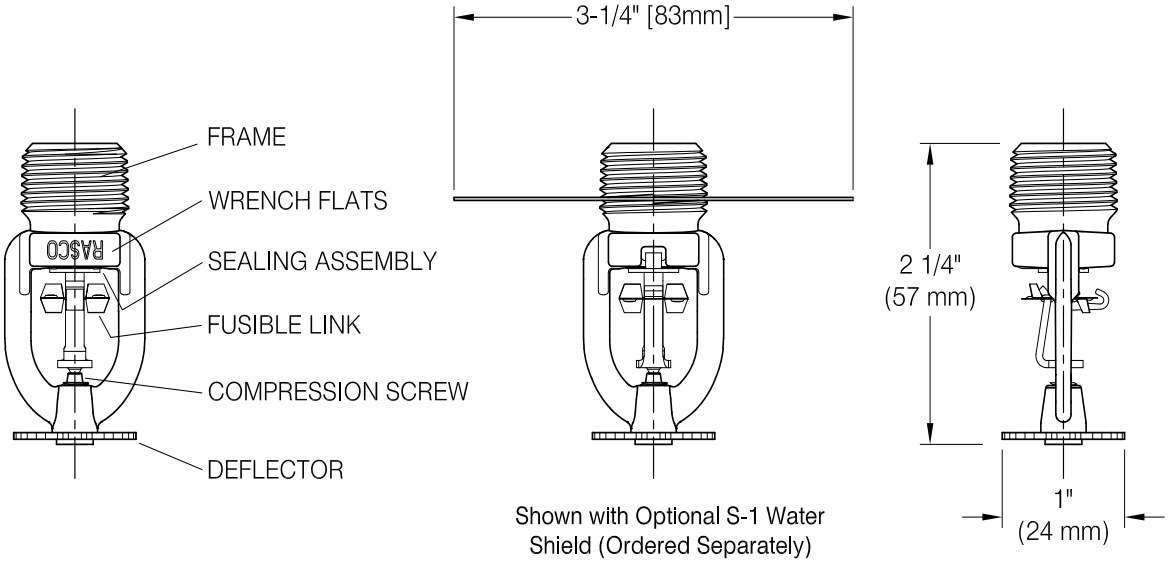
Sensitivity
Quick-response

Temperature Ratings
165°F (74°C), Gray Link
212°F (100°C), White Link

Recessed Escutcheons/Cover Plates
Model F1 escutcheon (cULus only)
Model F2 escutcheon (cULus, FM)
Model FP escutcheon (cULus only)
Model CCP cover plate (cULus only)

Guards/Water Shields
F-7 Guard (cULus)
F-1 Guard (FM)
F-8 Guard/Water Shield (cULus)
F-5 Guard/Water Shield (FM)
S-1 Water Shield (cULus, FM)

Model KFR56 Pendent Sprinkler Components and Dimensions — **Figure 1**



Shown with Optional S-1 Water Shield (Ordered Separately)

Model KFR56 Upright Sprinkler — SIN RA3624

Technical Specifications
Style: Upright
Threads: 1/2" NPT or ISO7-1R1/2
Nominal K-Factor: 5.6 (80 metric)
Max. Working Pressure:
cULus: 250 psi (17.2 bar)
FM, VdS, CE: 175 psi (12 bar)

Material Specifications
Thermal Sensor: Beryllium Nickel
Strut and Lever: Stainless Steel
Roto-clip: Stainless Steel
Sprinkler Frame: Brass Alloy
Cap: Bronze Alloy
Sealing Washer: Nickel with PTFE
Load Screw: Copper Alloy
Deflector: Brass Alloy

Sprinkler Wrench
Model W2
Model W14 (with guard installed)

Listings and Approvals
cULus Listed
FM Approved
VdS Approved
CE Certificate of constancy of performance
0786-CPR40314
UKCA: 0832-UKCA-CPR-S5075

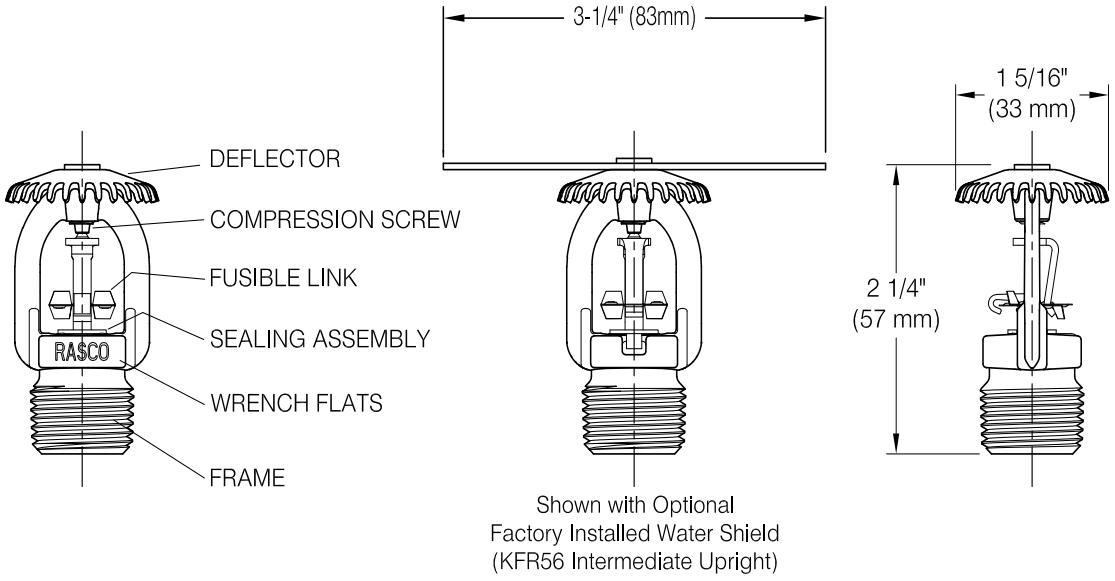
Sprinkler Finishes
(See Table C)

Sensitivity
Quick-response

Temperature Ratings
165°F (74°C), Gray Link
212°F (100°C), White Link

Guards/Water Shields
F-1 Guard (cULus, FM)
F-3 Guard/Water Shield (cULus, FM)
Factory Installed Shield (cULus, FM)

Model KFR56 Upright Sprinkler Components and Dimensions — **Figure 2**



Model KFR56 HSW Horizontal Sidewall Sprinkler — SIN RA3634

Technical Specifications
Style: HSW or Recessed HSW
Threads: 1/2" NPT or ISO7-1R1/2
Nominal K-Factor: 5.6 (80 metric)
Max. Working Pressure:
cULus: 250 psi (17.2 bar)
FM, VdS, CE: 175 psi (12 bar)

Material Specifications
Thermal Sensor: Beryllium Nickel
Strut and Lever: Stainless Steel
Roto-clip: Stainless Steel
Sprinkler Frame: Brass Alloy
Cap: Bronze Alloy
Sealing Washer: Nickel with PTFE
Load Screw: Copper Alloy
Deflector: Brass Alloy

Sprinkler Wrenches
Model W2 (non-recessed)
Model W1 or W4 (recessed)
Model W14 (with guard installed)

Listings and Approvals
cULus Listed[1]
FM Approved
VdS Approved
CE Certificate of constancy of performance
0786-CPR40312
UKCA: 0832-UKCA-CPR-S5073

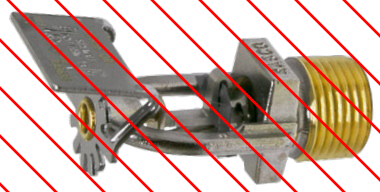
Sprinkler Finishes
(See Table C)

Sensitivity
Quick-response

Temperature Ratings
165°F (74°C), Gray Link
212°F (100°C), White Link

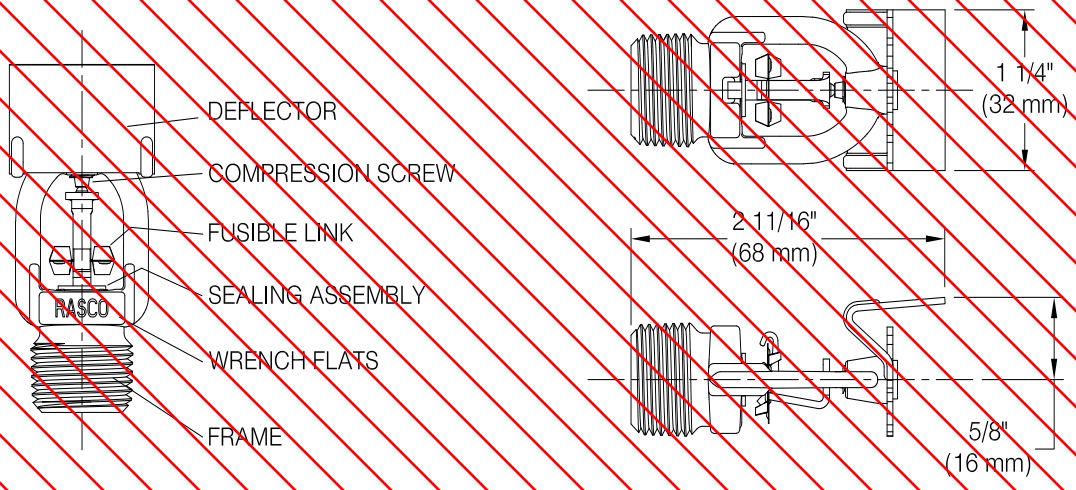
Recessed Escutcheons
Model F1 escutcheon (cULus only)
Model F2 escutcheon (cULus, FM)
Model FP escutcheon (cULus only)

Guards
F-7 Guard (cULus)
F-4 Guard (FM)



Notes:
1. cULus Listed for Light and Ordinary Hazard when installed exposed or surface mounted.

Model KFR56 HSW Sprinkler Components and Dimensions — **Figure 3**

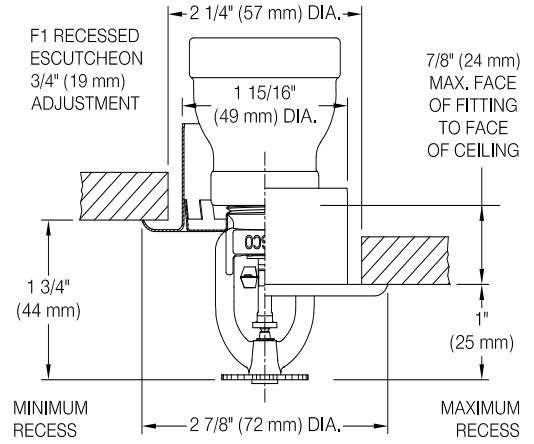


Recessed Escutcheon and Conical Concealed Cover Plate Dimensions **Table B**

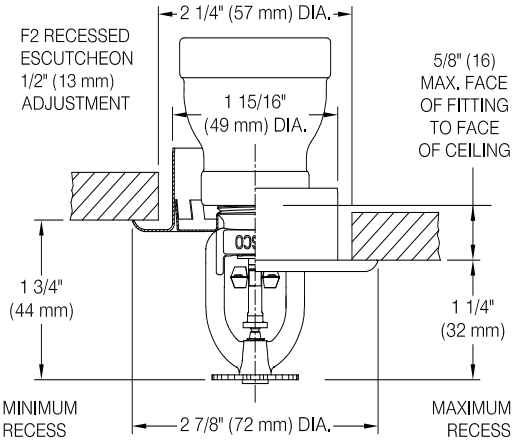
Type	Adjustment Inch (mm)	Maximum Face of Fitting to Ceiling* Inch (mm)	Minimum Face of Fitting to Ceiling* Inch (mm)	Maximum Deflector Distance Below Ceiling Inch (mm)	Minimum Deflector Distance Below Ceiling Inch (mm)
F1	3/4 (19)	7/8 (24)	1/8 (3)	1-3/4 (44)	1 (25)
F2	1/2 (12)	5/8 (16)	1/8 (3)	1-3/4 (44)	1-1/4 (32)
FP	1/2 (12)	1-1/2 (38)	1 (25)	1 (25)	1/2 (12)
CCP	1/2 (12)	1-1/2 (38)	1 (25)	1 (25)	1/2 (12)

***Note:** Face of fitting to ceiling dimensions are based on nominal thread make up. Verify dimensions based on fitting and thread sealing method prior to installation.

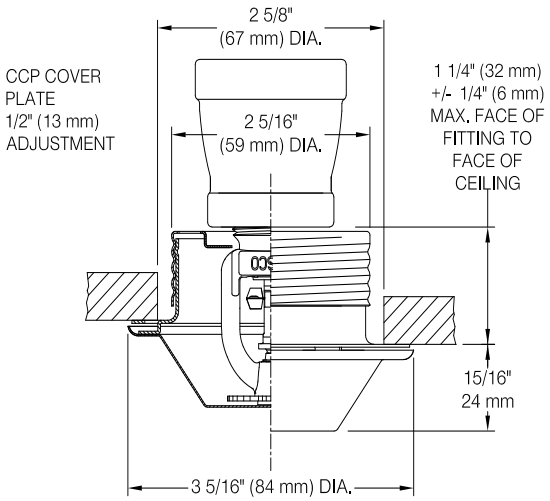
Recessed Escutcheon and Conical Concealed Cover Plate Diagrams **Figure 4**



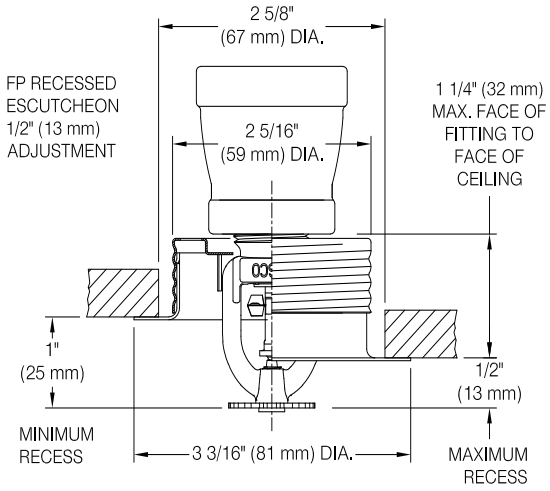
F1 RECESSED ESCUTCHEON INSTALLATION



F2 RECESSED ESCUTCHEON INSTALLATION



CCP COVER PLATE INSTALLATION

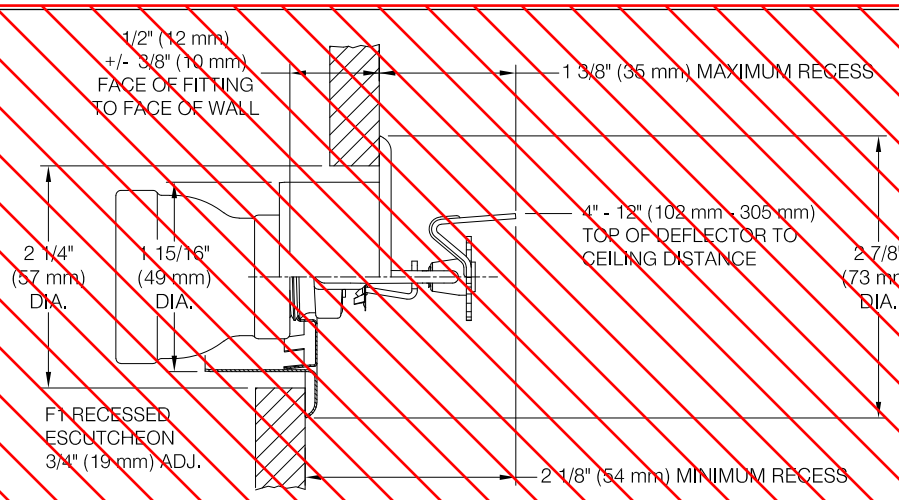


FP RECESSED ESCUTCHEON INSTALLATION

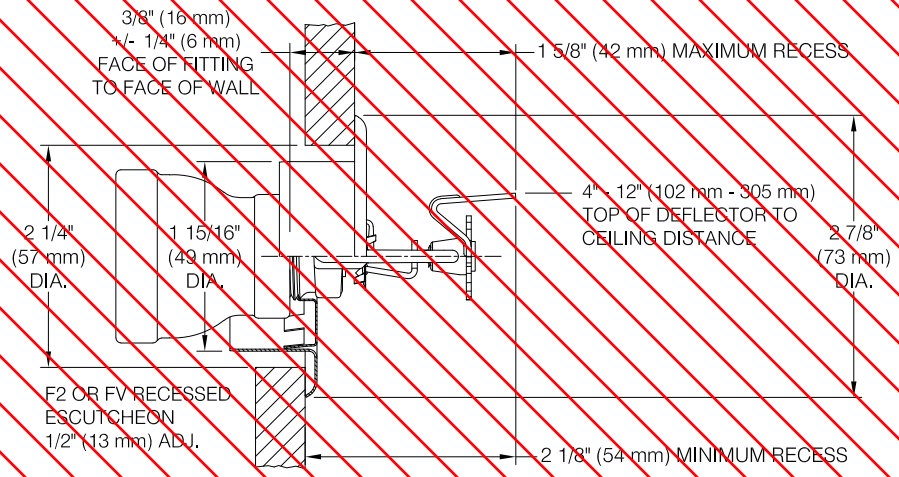
Note: Pendent sprinklers with CCP cover plates or FP recessed escutcheons shall not be installed in locations where the pressure in the ceiling is positive with respect to the pressure below the ceiling. Ensure that the openings in the cup are unobstructed following installation.

Model KFR56 HSW Recessed Escutcheon Diagrams

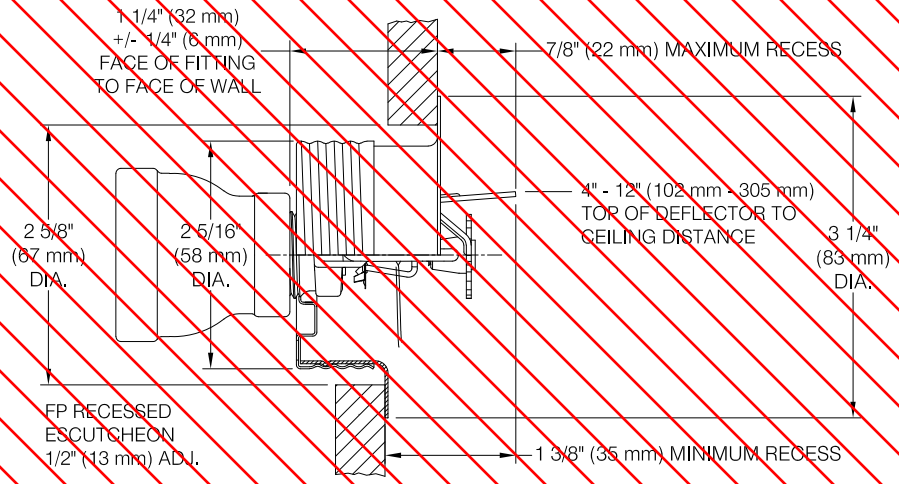
Figure 5



F1 RECESSED ESCUTCHEON INSTALLATION



F2 RECESSED ESCUTCHEON INSTALLATION



FP RECESSED ESCUTCHEON INSTALLATION

Note: Sidewall sprinklers with FP recessed escutcheons shall not be installed in locations where the pressure in or behind the wall is positive with respect to the pressure in the protected area. Ensure that the openings in the FP cup are unobstructed following installation.

Sprinkler, Escutcheon, and Cover Plate Finishes[1] **Table C**

Standard Finishes			Special Application Finishes		
Sprinkler	**F1, F2 , and FP[2] Escutcheons**	**CCP Cover Plate**	**Sprinkler**	**F1, F2 , and FP[2] Escutcheons**	**CCP Cover Plate**
Bronze	Brass	--	Bright Brass	Bright Brass	Bright Brass
Chrome Plated	Chrome Plated	Chrome Plated	Satin Chrome	Satin Chrome	Satin Chrome
White Polyester	White Polyester	White Paint	Black Polyester	Black Polyester	Black Paint
			Custom Color Polyester	Custom Color Polyester	Custom Color Paint

Notes:

[1] Paint or any other coating applied over the factory finish will void all approvals and warranties.

[2] The Model FP escutcheon assembly consists of an unfinished galvanized cup with a finished escutcheon ring.

Wrench

Model W2 (non-recessed)

Model W14 (with guard installed)

Model W1 (recessed & concealed)

Model W4 (alt. recessed & concealed)

Maintenance

Reliable Model KFR56 series sprinklers should be inspected and the sprinkler system maintained in accordance with NFPA 25, as well as the requirements of any Authorities Having Jurisdiction.

Prior to installation, sprinklers should remain in the original cartons and packaging until used. This will minimize the potential for damage to sprinklers that could cause improper operation or non-operation.

Do not clean sprinklers with soap and water, ammonia liquid or any other cleaning fluids. Remove dust by gentle vacuuming without touching the sprinkler.

Replace any sprinkler which has been painted (other than factory applied). A stock of spare sprinklers should be maintained to allow quick replacement of damaged or operated sprinklers.

Failure to properly maintain sprinklers may result in inadvertent operation or non-operation during a fire event.

Guarantee

For the Reliable Automatic Sprinkler Co., Inc. guarantee, terms, and conditions, visit www.reliablesprinkler.com.

Ordering Information

Specify the following when ordering.

Sprinkler

- Model (KFR56 Pendent, KFR56 Upright, KFR56 Upright Intermediate, or KFR56 HSW)
- Temperature Rating [165°F (74°C) or 212°F (100°C)]
- Threads ($1/2$" NPT or ISO 7-1 R$3/4$)
- Finish (See Table C)

Escutcheon or Coverplate

- Type (None, F1, F2, FP, or CCP)
- Finish (See Table C)

Guards/Water Shields

- See sprinkler information pages in this bulletin

Sprinkler Wrench

- W2 (Pendent, Upright, & HSW)
- W1 or W4 (Recessed Pendent & HSW, CCP)
- W14 (with guard installed)

P/N 9999970483

Reliable®

Model G5 Series Sprinklers

Standard Spray, Flat Concealed Pendent

Available with Gasketed Cover Plate

Features

- Standard Coverage, Concealed Pendent (K2.8, 4.2, 5.6, & 8.0 [40, 60, 80, & 115 metric])
- Flat concealed cover plate available in a variety of finishes.
- Available with Stainless Steel Clad cover plate (see Table I).
- 3/4-inch (19 mm) cover plate adjustment.
- Cover plate available with optional gasket.

Product Description

Model G5 series sprinklers are standard coverage, flat plate concealed sprinklers designed for installation in accordance with NFPA 13 and FM Global Property Loss Prevention Data Sheets. All Model G5 series sprinklers use a fusible-link operating element.

The sprinklers are offered with a standard Model G5 cover plate, a Model G5 cover plate with a quick-response (QR) gasket, or a Model G5 cover plate with a standard-response (SR) gasket. Model G5 sprinklers with a gasketed cover plate are intended for use in dust free environments such as clean rooms.

Model G5 sprinklers must only be used with the Model G5 cover plate listed or approved with the sprinkler. Table A provides a summary of available Model G5 series sprinklers, along with Listing and Approval information for each sprinkler and cover plate combination.

Important! Reliable fire sprinklers must be handled, stored, and installed in accordance with the guidelines in Caution Sheet 310 and this bulletin. Failure to follow these instructions may result in unintended operation or nonoperation of the fire protection system.

Model G5 Cover Plate

Model G5 Cover Plate with QR Gasket

Model G5 Cover Plate with SR Gasket

Note: Gasket material is silicone rubber, available in white only.

Model G5 Series Sprinkler Summary — **Table A**

Sprinkler Model	K-Factor gpm/psi$^{1/2}$ (L/min/bar$^{1/2}$)	Cover Plate Model	Listings and Approvals	Sensitivity	Max. Working Pressure psi (bar)	Sprinkler Identification Number (SIN)
G5-28	2.8 (40)	G5	cULus	QR	175 (12)	RA3411
			FM	SR		
		G5 QR Gasket	cULus	QR		
		G5 SR Gasket	cULus, FM	SR		
G5-42	4.2 (60)	G5	cULus	QR	175 (12)	RA3413
		G5 QR Gasket				
		G5 SR Gasket	cULus	SR		
G5-56	5.6 (80)	G5	cULus	QR	250 (17)	RA3415
			FM, LPCB, VdS, CE, UKCA	SR	175 (12)	
		G5 QR Gasket	cULus	QR	250 (17)	
		G5 SR Gasket	cULus	SR	250 (17)	
			FM	SR	175 (12)	
G5-56 300	5.6 (80)	G5	cULus	QR	300 (21)	RA4014
		G5 QR Gasket				
		G5 SR Gasket	cULus	SR		
G5-80	8.0 (115)	G5	cULus	QR	175 (12)	RA3412
		G5 QR Gasket				
		G5 SR Gasket	cULus	SR		
G5-80F	8.0 (115)	G5	FM	SR	175 (12)	RA3417
		G5 SR Gasket				

Model G5-28 Standard Coverage, Concealed Pendent Sprinkler — SIN RA3411

Technical Specifications
Style: Flat Concealed Pendent
Threads: 1/2" NPT or ISO 7-1 R1/2
Nominal K-Factor: 2.8 (40 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications
Fusible Link: Beryllium Nickel
Sprinkler Body: Brass Alloy
Levers: Bronze Alloy
Yoke: Brass Alloy
Sealing washer: Nickel with PTFE
Load Screw: Bronze Alloy
Towers: Copper Alloy
Pins: Stainless Steel
Deflector: Bronze Alloy
Cup: Steel

Temperature Ratings
Ordinary
165°F (74°C) (Sprinkler)
[135°F (57°C) (Cover Plate)]
Intermediate
212°F (100°C) (Sprinkler)
[165°F (74°C) (Cover Plate)]

Sensitivity
(See Table B)

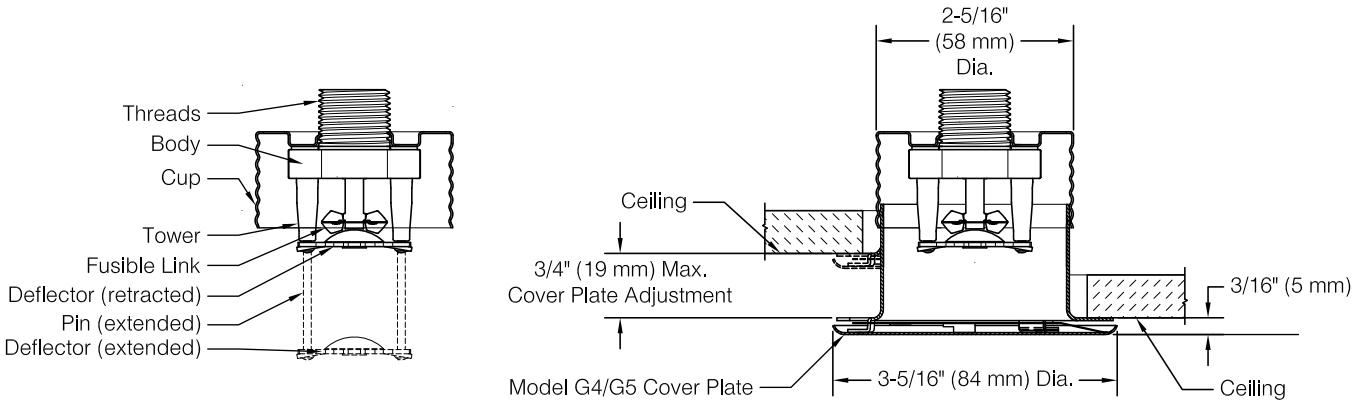
Cover Plates
Model G5
Model G5 QR Gasket (cULus only)
Model G5 SR Gasket

Cover Plate Finishes
(See Table I)

Sprinkler Wrench
Model W3
Model FC

Listings and Approvals
cULus Listed (Light Hazard only)
FM Approved

Model G5-28 Sprinkler Components and Dimensions — Figure 1



Model G5-28 Sprinkler Sensitivity — Table B

Cover Plate Model	Listing or Approval Agency	
	cULus	FM
G5	QR	SR
G5 QR Gasket	QR	--
G5 SR Gasket	SR	SR

QR: Quick-response
SR: Standard-response

Model G5-42 Standard Coverage, Concealed Pendent Sprinkler — SIN RA3413

Technical Specifications
Style: Flat Concealed Pendent
Threads: 1/2" NPT or ISO 7-1 R1/2
Nominal K-Factor: 4.2 (60 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications
Fusible Link: Beryllium Nickel
Sprinkler Body: Brass Alloy
Levers: Bronze Alloy
Yoke: Brass Alloy
Sealing washer: Nickel with PTFE
Load Screw: Bronze Alloy
Towers: Copper Alloy
Pins: Stainless Steel
Deflector: Bronze Alloy
Cup: Steel

Temperature Ratings
Ordinary
165°F (74°C) (Sprinkler)
[135°F (57°C) (Cover Plate)]
Intermediate
212°F (100°C) (Sprinkler)
[165°F (74°C) (Cover Plate)]

Sensitivity
(See Table C)

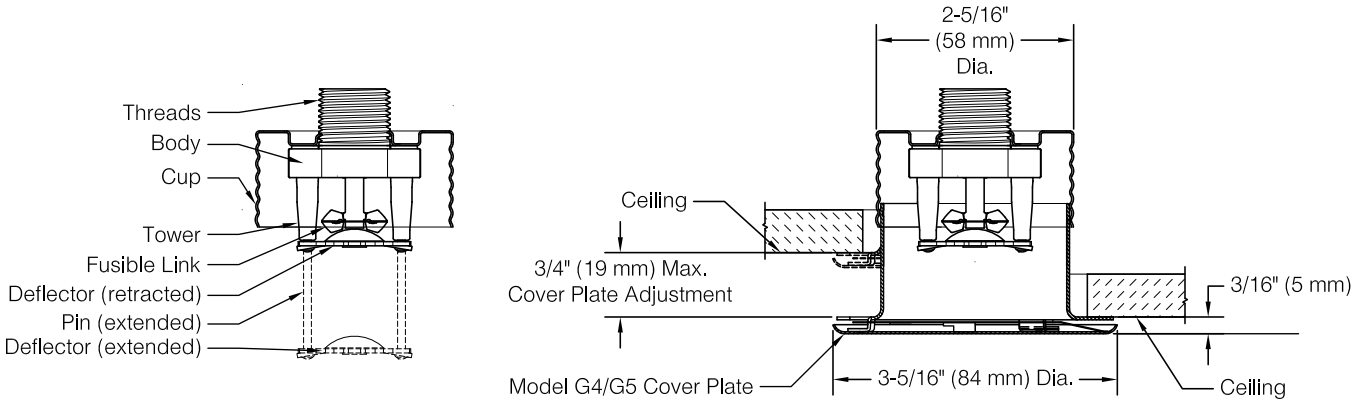
Cover Plates
Model G5
Model G5 QR Gasket
Model G5 SR Gasket

Cover Plate Finishes
(See Table I)

Sprinkler Wrench
Model W3
Model FC

Listings and Approvals
cULus Listed (Light Hazard only)

Model G5-42 Sprinkler Components and Dimensions — Figure 2



Model G5-42 Sensitivity — Table C

Cover Plate Model	Listing or Approval Agency
	cULus
G5	QR
G5 QR Gasket	QR
G5 SR Gasket	SR

QR: Quick-response
SR: Standard-response

Model G5-56 Standard Coverage, Concealed Pendent Sprinkler — SIN RA3415

Technical Specifications
Style: Flat Concealed Pendent
Threads: 1/2" NPT or ISO 7-1 R1/2
Nominal K-Factor: 5.6 (80 metric)
Max. Working Pressure:
175 psi (12 bar)
250 psi (17 bar) (cULus only)

Material Specifications
Fusible Link: Beryllium Nickel
Sprinkler Body: Brass Alloy
Levers: Bronze Alloy
Yoke: Brass Alloy
Sealing washer: Nickel with PTFE
Load Screw: Bronze Alloy
Towers: Copper Alloy
Pins: Stainless Steel
Deflector: Bronze Alloy
Cup: Steel

Temperature Ratings
Ordinary
165°F (74°C) (Sprinkler)
[135°F (57°C) (Cover Plate)]
Intermediate
212°F (100°C) (Sprinkler)
[165°F (74°C) (Cover Plate)]

Sensitivity
(See Table D)

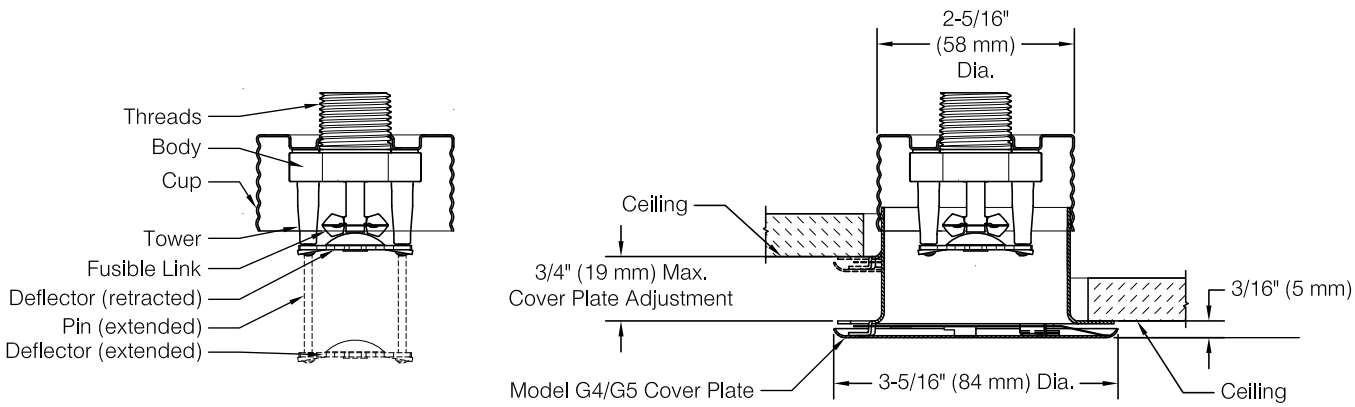
Cover Plates
Model G5
Model G5 QR Gasket (cULus only)
Model G5 SR Gasket (cULus and FM only)

Cover Plate Finishes
(See Table I)

Sprinkler Wrench
Model W3
Model FC

Listings and Approvals
cULus Listed (Light & Ordinary Hazard only)
FM Approved
LPCB Approved
VdS Approved [165°F (74°C) only]
CE Listed (2831-CPR-S2062)
UKCA: 0832-UKCA-CPR-S5045

Model G5-56 Sprinkler Components and Dimensions — Figure 3



Model G5-56 Sensitivity — Table D

Cover Plate Model	Listing or Approval Agency		
	cULus	FM	LPCB, VdS, CE, UKCA
G5	QR	SR	SR
G5 QR Gasket	QR	--	--
G5 SR Gasket	SR	SR	--

QR: Quick-response
SR: Standard-response

Model G5-56 300 Standard Coverage, Concealed Pendent Sprinkler — SIN RA4014

Technical Specifications
- **Style:** Flat Concealed Pendent
- **Threads:** 1/2" NPT or ISO 7-1 R1/2
- **Nominal K-Factor:** 5.6 (80 metric)
- **Max. Working Pressure:** 300 psi (21 bar)

Material Specifications
- **Fusible Link:** Beryllium Nickel
- **Sprinkler Body:** Brass Alloy
- **Levers:** Bronze Alloy
- **Yoke:** Brass Alloy
- **Sealing washer:** Nickel with PTFE
- **Load Screw:** Bronze Alloy
- **Towers:** Copper Alloy
- **Pins:** Stainless Steel
- **Deflector:** Bronze Alloy
- **Cup:** Steel

Temperature Ratings
Ordinary
165°F (74°C) (Sprinkler)
[135°F (57°C) (Cover Plate)]
Intermediate
212°F (100°C) (Sprinkler)
[165°F (74°C) (Cover Plate)]

Sensitivity
(See Table E)

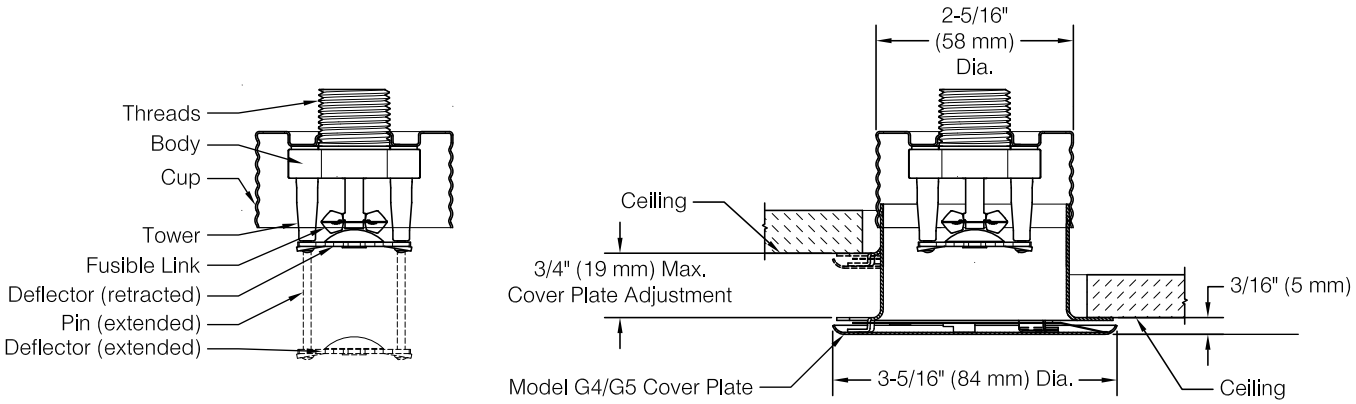
Cover Plates
Model G5
Model G5 QR Gasket
Model G5 SR Gasket

Cover Plate Finishes
(See Table I)

Sprinkler Wrench
Model W3
Model FC

Listings and Approvals
cULus Listed (Light & Ordinary Hazard only)

Model G5-56 300 Sprinkler Components and Dimensions — **Figure 4**



Model G5-56 300 Sensitivity — **Table E**

Cover Plate Model	Listing or Approval Agency
	cULus
G5	QR
G5 QR Gasket	QR
G5 SR Gasket	SR

QR: Quick-response
SR: Standard-response

Model G5-80 Standard Coverage, Concealed Pendent Sprinkler — SIN RA3412

Technical Specifications
Style: Flat Concealed Pendent
Threads: 3/4" NPT or ISO 7-1 R3/4
Nominal K-Factor: 8.0 (115 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications
Fusible Link: Beryllium Nickel
Sprinkler Body: Brass Alloy
Levers: Bronze Alloy
Yoke: Brass Alloy
Sealing washer: Nickel with PTFE
Load Screw: Bronze Alloy
Towers: Copper Alloy
Pins: Stainless Steel
Deflector: Bronze Alloy
Cup: Steel

Temperature Ratings
Ordinary
165°F (74°C) (Sprinkler)
[135°F (57°C) (Cover Plate)]
Intermediate
212°F (100°C) (Sprinkler)
[165°F (74°C) (Cover Plate)]

Sensitivity
(See Table F)

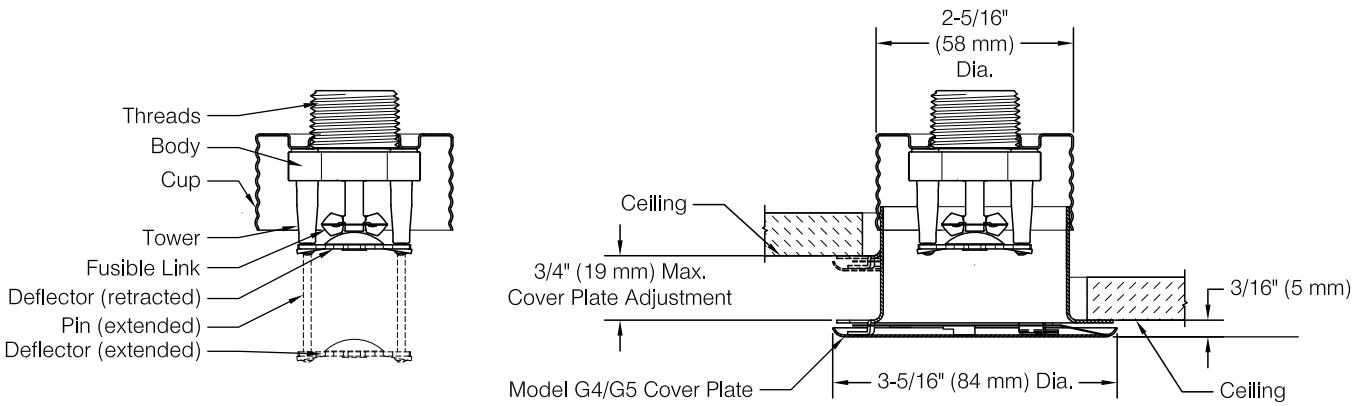
Cover Plates
Model G5
Model G5 QR Gasket
Model G5 SR Gasket

Cover Plate Finishes
(See Table I)

Sprinkler Wrench
Model W3
Model FC

Listings and Approvals
cULus Listed (Light & Ordinary Hazard only)

Model G5-80 Sprinkler Components and Dimensions — Figure 5



Model G5-80 Sensitivity — Table F

Cover Plate Model	Listing or Approval Agency
	cULus
G5	QR
G5 QR Gasket	QR
G5 SR Gasket	SR

QR: Quick-response
SR: Standard-response

Model G5-80F Standard Coverage, Concealed Pendent Sprinkler — SIN RA3417

Technical Specifications
Style: Flat Concealed Pendent
Threads: 3/4" NPT or ISO 7-1 R3/4
Nominal K-Factor: 8.0 (115 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications
Fusible Link: Beryllium Nickel
Sprinkler Body: Brass Alloy
Levers: Bronze Alloy
Yoke: Brass Alloy
Sealing washer: Nickel with PTFE
Load Screw: Bronze Alloy
Towers: Copper Alloy
Pins: Stainless Steel
Deflector: Stainless Steel
Cup: Steel

Temperature Ratings
Ordinary
165°F (74°C) (Sprinkler)
[135°F (57°C) (Cover Plate)]
Intermediate
212°F (100°C) (Sprinkler)
[165°F (74°C) (Cover Plate)]

Sensitivity
Standard Response

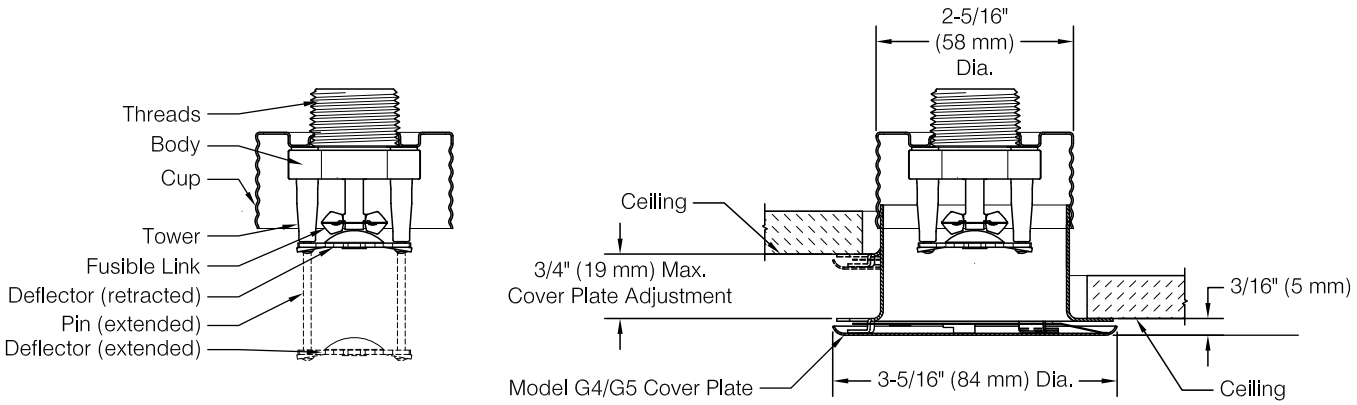
Cover Plates
Model G5
Model G5 SR Gasket

Cover Plate Finishes
(See Table I)

Sprinkler Wrench
Model W3
Model FC

Listings and Approvals
FM Approved

Model G5-80F Sprinkler Components and Dimensions — **Figure 6**



Model G5-80F Sensitivity — **Table G**

Cover Plate Model	Listing or Approval Agency
	FM
G5	SR
G5SR Gasket	SR

SR: Standard-response

Installation Dimensions and Cover Plate Information — **Table H**

Cover Plate Model	Cover Plate Diameter Inch (mm)	Recommended Hole Diameter in Ceiling Inch (mm)	Cover Plate Adjustment Inch (mm)	Min. to Max. Face of Fitting to Ceiling[1] Inch (mm)	Min. to Max. Dropped Deflector Distance below Ceiling Inch (mm)	Cover Plate Temperature Rating °F (°C)
G5	3-5/16 (84)	2-5/8 (67)	3/4 (19)	1-1/2 to 2-1/4 (38 to 57)	1/4 to 1 (6 to 25)	135°F[3] (57°C) or 165°F[4] (74°C)
G5 QR Gasket[2]	3-11/16 (94)					
G5 SR Gasket[2]	4 (101 mm)					

Notes:

1. Face of fitting to ceiling dimensions are based on nominal thread make up. Verify dimensions based on fitting and thread sealing method prior to installation. A 1/2" x 1/2" brass nipple extension (Reliable P/N 6999991900) is available to assist with replacement of Reliable Model G4A sprinklers.
2. Model G5 QR Gasket and Model G5 SR Gasket cover plates are sold as assembled units including both the cover plate and gasket. Model G5 QR Gasket and Model G5 SR Gasket cover plates and gaskets are not interchangeable.
3. For use with 165°F (74°C) temperature rated sprinklers where the Maximum Ceiling Temperature does not exceed 100°F (38°C).
4. For use with 212°F (100°C) temperature rated sprinklers where the Maximum Ceiling Temperature does not exceed 150°F (66°C).

Cover Plate Finishes[1][2] — **Table I**

Standard Finishes	Special Application Finishes
White Paint Chrome	Off-White Paint Black Paint Custom Color Paint (Specify)[3] Raw Brass (Lacquered) Bright Brass Finished Bronze Satin Chrome Stainless Steel Clad[4] Custom Printed

Notes:

1. Paint or any other coating applied over the factory finish will void all approvals and warranties.
2. Cover plates do not carry corrosion resistant listings or approvals.
3. Custom color paint is semi-gloss unless specified otherwise.
4. Stainless steel clad cover plates are Type 316 Stainless Steel on the finished side and C102 Copper Alloy on the back side.

Application

Model G5 series sprinklers are standard coverage, flat plate concealed pendent sprinklers. The sprinklers are intended for use in accordance with NFPA 13 and FM Global Property Loss Prevention Data Sheets, as well as the requirements of the applicable approval agencies.

Model G5 series sprinklers are available as either Quick-response (QR) or Standard-response (SR) depending on the approval agency and cover plate selected.

Model G5 series sprinklers use Model G5 flat cover plates. Model G5 QR Gasket and G5 SR Gasket cover plates are available to limit air and dust movement through the ceiling.

Listing & Approval Agencies

Individual Model G5 series sprinkler may be listed or approved by the following agencies:

- Underwriters Laboratories, Inc. and UL Canada (cULus)
  Listing Category: Sprinklers, Automatic and Open
  Guide Number: VNIV
- FM Approvals (FM)
- Loss Prevention Certification Board (LPCB)
- VdS Schadenverhütung GmbH (VdS)
- EC-Certificate of Conformity 0832-CPD-2062 (CE)
- UKCA EN12259-1 : 1999 +A3:2006

See Table A and the individual sprinkler data sheets in this Bulletin for listings and approvals applicable to each sprinkler.

Installation

Model G5 series sprinklers are intended to be installed in accordance with NFPA 13, FM Global Property Loss Prevention Data Sheets, and the requirements of applicable authorities having jurisdiction. Model G5 series sprinklers must not be installed in ceilings with positive pressure in the space above. Ensure that the 4 slots in the cup are open and unobstructed following installation.

Model G5 series sprinklers are shipped with a wrench-able protective cap that should remain on the sprinkler until the sprinkler system is placed in service following construction.

Model G5 series sprinklers can be installed without removing the wrench-able protective cap using the Model W3 wrench. Alternatively, Model G5 series sprinklers can be installed using the Model FC wrench by temporarily removing the protective cap during installation of the sprinkler. The use of any other wrench to installed Model G5 series sprinklers is not permitted and may damage the sprinkler.

Wrench

Model FC
For use with Model G5 Series sprinklers without wrench-able cap installed

Model W3
For use with Model G5 Series sprinklers with wrench-able cap installed

Fully insert the Model W3 wrench over the cap until it reaches the bottom of the cup, or the Model FC wrench over the sprinkler until the wrench engages the body. Do not wrench any other part of the sprinkler/cup assembly. The Model W3 and FC wrenches are designed to be turned with a standard 1/2" square drive. Tighten the sprinkler into the fitting after applying a PTFE based thread sealant to the sprinkler's threads. Recommended installation torque is specified in Table J.

Installation Torque — **Table J**

Sprinkler Threads	Recommended Installation Torque (min. – max.)	
	ft.lb	N·m
½" NPT or ISO7-1R1/2	8-18	11-24
¾" NPT or ISO7-1R3/4	14-20	19-27

Do not exceed the maximum recommended torque. Exceeding the maximum recommended torque may cause leakage or impairment of the sprinkler. Use care when inserting or removing the wrench from the sprinkler to avoid damage to the sprinkler.

Install the cover plate by hand, pushing and then turning the cover in the clockwise direction until it is tight against the ceiling. For Model G5 QR Gasket and Model G5 SR Gasket cover plates, the gasket should be attached to the flange of the cover plate skirt only. Do not glue the gasket in place or allow the gasket to overlap both the cover plate and the flange of the skirt.

Maintenance

Reliable Model G5 series sprinkler should be inspected and the sprinkler system maintained in accordance with NFPA 25, as well as the requirements of any Authorities Having Jurisdiction.

Prior to installation, sprinklers should remain in the original cartons and packaging until used. This will minimize the potential for damage to sprinklers that could cause improper operation or non-operation.

Do not clean sprinklers with soap and water, ammonia liquid or any other cleaning fluids. Remove dust by gentle vacuuming without touching the sprinkler.

Replace any sprinkler or cover plate which has been painted (other than factory applied). Properly installed Model G5 cover plates will have an air gap that is required for proper operation, do not seal the gap or paint the cover plates. Model G5 series sprinklers have holes in the cup that must remain unobstructed.

Replace any sprinkler which has been damaged. A stock of spare sprinklers should be maintained to allow quick re-placement of damaged or operated sprinklers. Failure to properly maintain sprinklers may result in inadvertent operation or non-operation during a fire event.

Guarantee

For the Reliable Automatic Sprinkler Co., Inc. guarantee, terms, and conditions, visit www.reliablesprinkler.com.

Patents

Model G5 series sprinklers may be covered by one or more of the following patents:

U.S. Patent 6,554,077, U.S. Patent 7,275,603, U.S. Patent 8,776,903, U.S. Patent 9,248,327

Ordering Information

Specify the following when ordering.

Sprinkler
- Model [G5-28] [G5-42] [G5-56] [G5-56 300] [G5-80] [G5-80F]
- Temperature Rating [165°F (74°C)] [212°F (100°C)]
- Threads [NPT or ISO 7-1]

Cover Plate
- Model [G5, G5 QR Gasket, G5 SR Gasket]
- Finish (See Table I)

Sprinkler Wrench
- Model W3
- Model FC

P/N 9999970421

TECHNICAL DATA

INSTITUTIONAL SPRINKLERS K5.6

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

1. DESCRIPTION

Viking Institutional Style Sprinklers are small, flush, solder link and lever sprinklers made with tamper-resistant construction. These flush-mount sprinklers can be ordered as Quick Response, Quick Response-Extended Coverage, and as Pendent or Horizontal Sidewall configurations. Additionally, the VK427 can be used as Standard Response (FM only). Viking institutional sprinklers have been specifically designed for use with concealed piping in institutional mental health occupancies, correctional facilities, or anywhere a likelihood of tampering with fire sprinklers by the occupants may exist.

The institutional sprinkler assembly consists of the sprinkler body and a 3 or 4 inch escutcheon plate. The sprinkler and escutcheon plate are available with a polished chrome or painted finish.

SIN	THREAD	DESCRIPTION
VK426	NPT	QR Pendent
VK650	NPT	QR EC Pendent
VK427	NPT	QR or SR[1] HSW
VK651	NPT	QR EC HSW
VK426	BSPT	QR Pendent
VK650	BSPT	QR EC Pendent
VK427	BSPT	QR or SR[1] HSW
VK651	BSPT	QR EC HSW

1. VK427 is FM Approved as Standard Response (SR)

2. LISTINGS AND APPROVALS*

cULus Listed: Category VNIV

FM Approved: Class 2015 (VK427 ONLY)

* Refer to the Approval Charts and Design Criteria for requirements that must be followed.

NOTICE

THE VIKING CORPORATION DISCLAIMS ANY RESPONSIBILITY FOR DAMAGES OR INJURY (INCLUDING DEATH) CAUSED BY THE OPERATION OR INOPERATION OF SPRINKLERS ARISING OUT OF THE MISUSE OF OR TAMPERING WITH VIKING BRAND SPRINKLERS INCLUDING, WITHOUT LIMITATION, ANY PERSONAL INJURY OR DEATH ARISING OUT OF OR CAUSED BY THE MANIPULATION OF, DISMANTLING OF, OR ATTEMPTED USE OF THE SPRINKLER OR ANY COMPONENT AS AN INSTRUMENT UNRELATED TO ITS INTENDED USE.

3. TECHNICAL DATA

Specifications:
Minimum Operating Pressure: 7 psi (0.5 bar)
Rated to: 175 psi (12 bar) water working pressure.
Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2" NPT or 15 mm BSPT
Nominal K-factor: 5.6 U.S. (80.6 metric**)

**Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Material Standards:
Sprinkler Body: QM Brass
Deflector: Pendent - Copper UNS-C23000 or UNS-C51000, HSW - Copper UNS-C51000
Deflector Pins: Stainless Steel 302
Button: UNS-C36000
Compression Screw: Brass UNS-C36000
Fusible Link Assembly: UNS-C51910 and Eutectic Solder
Fusible Link Levers: Stainless Steel UNS-S31600
Lever Bar: Copper Alloy UNS-C72500
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
Seat: UNS-C31400 or UNS-C31600 Bronze 1/2 to full hard
Pin Ring: Pendent - Copper UNS-C23000, HSW - Copper UNS-C51000

Ordering Information: (Refer to Table 1 and the current Viking List Price Book.)

VIKING®

TECHNICAL DATA

INSTITUTIONAL SPRINKLERS K5.6

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

TABLE 1: ORDERING INFORMATION

INSTRUCTIONS:

Choose a sprinkler style and base part number then,
(1) add the suffix for the desired Finish
(2) add the suffix for the desired Temperature Rating.
(3) select an escutcheon plate and finish[4].

Style	Sprinkler Base Part Number	SIN	Size		1: Available Finishes		2: Available Temperature Ratings		
			NPT Inch	BSPT mm	Description	Suffix[1]	Nominal Rating	Max. Ambient Ceiling Temperature[3]	Suffix
QR Pendent	19663	VK426	1/2	--	Chrome	F	165 °F (74 °C)	100 °F (38 °C)	C
QR Pendent	20110	VK426	--	15	Painted white	M-/W	205 °F (96 °C)	150 °F (65 °C)	E
QR or SR[6] HSW	22885	VK427	1/2	--	Painted gray	M-/RAL9006			
QR or SR[6] HSW	22908	VK427	--	15	**NOTE: The escutcheons are available with the same finishes as the sprinklers.**		**3: Escutcheons[4]**		
QR EC Pendent	19876	VK650	1/2	--			**Description**	**Base Part Number**	
QR EC Pendent	20111	VK650	--	15			3” (75 mm)	23196	
QR EC HSW	22884	VK651	1/2	--			4” (100 mm)	23197	
QR EC HSW	22907	VK651	--	15					

Examples

Sprinkler: **19663MC/RAL9006** = VK426 Quick Response Pendent with Painted gray Finish and 165 °F (74 °C) Nominal temperature rating. This sprinkler is to be installed into an area with a maximum ambient temperature of 100 °F (38 °C) meaning if the area will experience temperatures above the maximum ambient rating, you shall use a higher temperature-rated sprinkler.

Escutcheon: **23196M/RAL9006** = 3” Diameter Escutcheon with Painted gray finish.

Accessories

Sprinkler Wrench (see Figure 1): Socket Wrench: Part No. 22847MB[2]
Retaining Flange (see Figure 1): Part Number 10599 (includes 1/8” allen head set screw[5])
Sprinkler Cabinet: Holds Up to 6 sprinklers: Part number 01731A

Footnotes

1. Where a dash (-) is shown in the Finish suffix designation, insert the desired Temperature Rating suffix. See example above.
2. Requires a 1/2” ratchet which is not available from Viking.
3. Based on NFPA 13, NFPA 13R, and NFPA 13D. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
4. The escutcheons are available with the same finishes as the sprinkler.
5. Requires a 1/8” allen wrench which is not available from Viking.
6. The VK427 is FM Approved as Standard Response. Refer the Approval Charts and design criteria for further details.

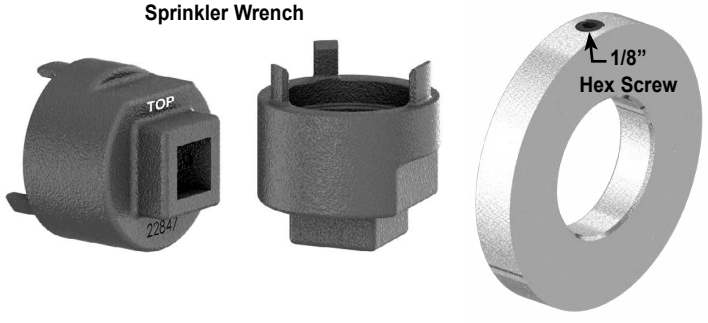


Figure 1: Sprinkler Accessories

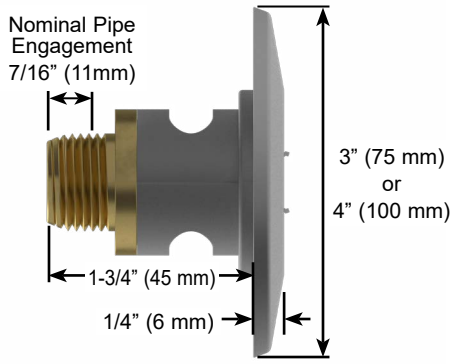


Figure 2: Sprinkler Dimensions (Pendent and HSW)

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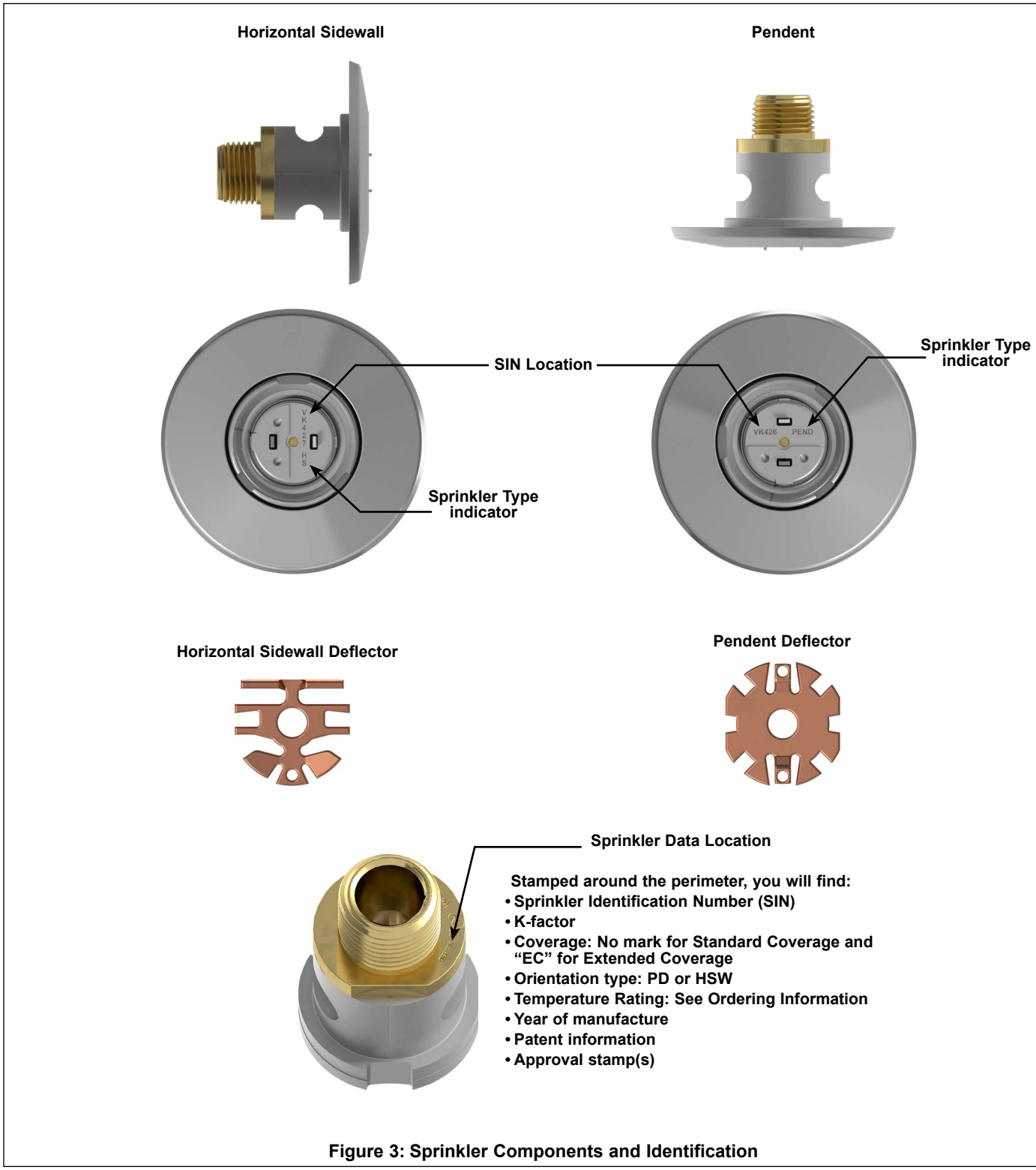

Figure 3: Sprinkler Components and Identification

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4. INSTALLATION

Refer to appropriate NFPA, FM Global, and/or any other applicable installation standards.

NOTICES

- **Sprinklers must be handled with care. They must be stored in a cool, dry place in their original shipping container. Never install sprinklers that have been dropped, damaged in any way, or exposed to temperatures in excess of maximum ambient temperature allowed. Such sprinklers should be destroyed immediately.**
- **Viking Institutional Sprinklers are not intended for use in corrosive environments. Use only sprinklers listed for corrosive environments when subject to corrosive atmospheres.**
- **Use care when locating sprinklers near fixtures that can generate heat. Do not install sprinklers where they will be exposed to temperatures that exceed the maximum recommended ambient temperature for the temperature rating used.**
- **Adequate heat must be provided when the Institutional Sprinklers are installed on wet-pipe systems.**
- **The sprinklers must be installed after the piping is in place to prevent mechanical damage. Before installing, be sure to have the appropriate sprinkler model and style, with the correct orifice size, temperature rating, and response characteristics.**

⚠ WARNING

Viking sprinklers are manufactured and tested to meet the rigid requirements of the approving agency. The sprinklers are designed to be installed in accordance with recognized installation standards. Deviation from the standards or any alteration to the sprinkler after it leaves the factory including, but not limited to: painting, plating, coating, or modification, may render the sprinkler inoperative and will automatically nullify the approval and any guarantee made by The Viking Corporation. Flush sprinklers are decorative sprinklers and may be considered special purpose. As such, some Authorities may limit the use depending on the occupancy classification. Refer to the Authority Having Jurisdiction prior to installation.

General Information:
The tamper-resistant design of the Viking Institutional Sprinklers is dependant upon proper installation as outlined in this document as well as proper piping design and installation. Proper installation ensures that the sprinkler assembly will be held in place by the force of the escutcheon pressing outward on the sprinkler body.

Pay close attention to the instructions below when installing these sprinklers.

Proper installation requires the following:

- The fitting in which the sprinkler is to be installed must be properly located according to the dimensions indicated below.
- The sprinkler fitting and drop nipple should be secured in place by installing the retaining flange as shown in the procedure below.
- The centerline of the fitting in which the sprinkler is to be installed must be perpendicular to the surface of the finished surface.
- Remove the sprinkler cap before placing the system into service.
- After installation, the entire system must be tested in accordance with recognized installation standards. The test is applied after sprinkler installation to ensure that no damage has occurred to the sprinkler during shipping and installation, and to make sure the unit has been properly tightened. If a thread leak occurs, normally the unit must be removed, new pipe-joint compound or tape applied, and then reinstalled. This is due to the fact that when the joint seal leaks, the sealing compound or tape is washed out of the joint

Tools and recommended supplies:

- PTFE Tape
- Institutional Sprinkler Wrench Part Number 22847M/B (requires a 1/2” socket wrench which is not available from Viking)
- 1/2” Ratchet wrench and (optional) extenstion
- 1/8” hex wrench (used for retaining flange hex screw; not available from Viking)
- Level
- Pliers

INSTALLATION TIP:

Prior to final installation, temporarily install all components described in the procedure below to verify the correct measurements have been achieved. If necessary, re-cut the supply drop nipple and repeat the procedure in order to achieve the correct measurements.

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Procedure:

NOTE: If the retaining flange assembly is to be used, slide the flange over the sprinkler drop nipple prior to threading the nipple into the branch line tee. For an alternative bracing method, refer to Figure 8.

1. Install all piping and cut the sprinkler drop nipple so that the ½" (15 mm) NPT outlet of the reducing coupling is at the correct elevation and centered in a 2" (50 mm) diameter opening in the ceiling.
2. Inspect the sprinkler assembly for damage.
3. Ensure the protective cap is on the sprinkler then apply a small amount of pipe-joint compound or tape (not shown) to the external threads of the sprinkler only, taking care not to allow a build-up of compound in the sprinkler inlet.
4. Install the escutcheon onto the sprinkler body as shown. DO NOT install the sprinkler without the escutcheon.
5. For HSW sprinklers Align the "TOP" marking on the wrench with the same marking on the protective cap. Place the sprinkler wrench over the protective cap on the sprinkler body.

   NOTE: The wrench is uniquely designed to fit over the sprinkler cap and into the sprinkler in a specific alignment.

6. Install the sprinkler into the fitting.

   NOTE: The Escutcheon plate MUST be tight against the ceiling or wall.

7. Tighten the sprinkler to approximately 7-14 ft-lbs.
8. If desired, use a level to ensure the HSW Institutional Sprinkler is in a horizontal position.

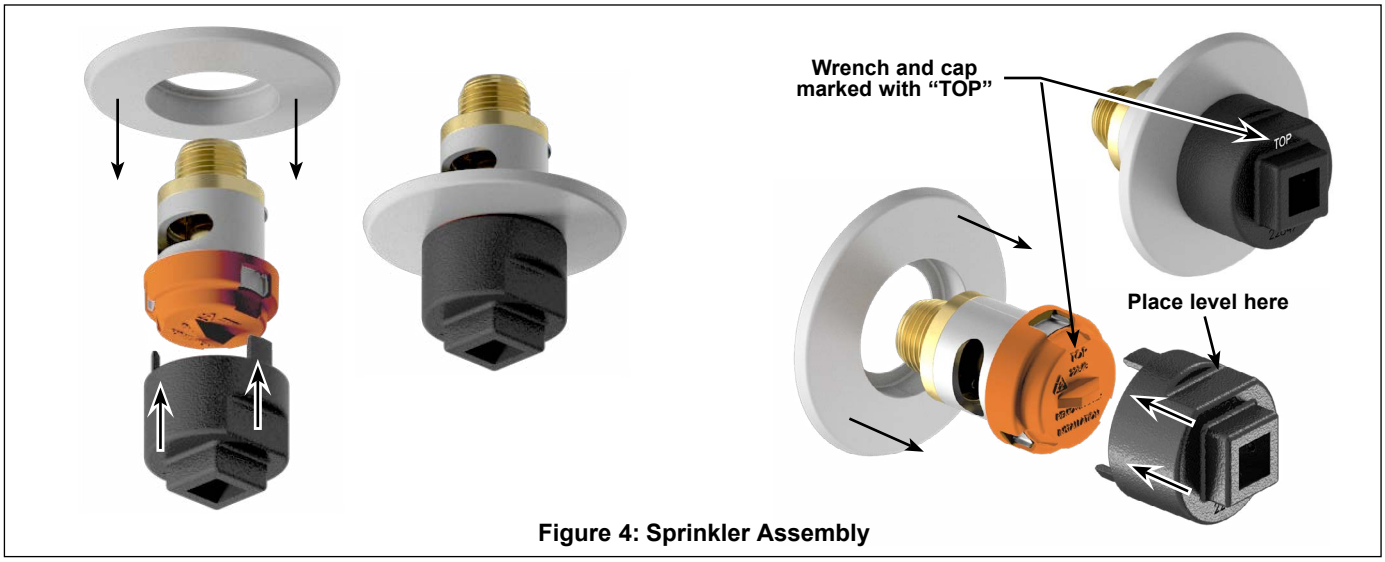

Figure 4: Sprinkler Assembly

9. To avoid damaging the sprinkler, carefully grasp the provided pull tab (manually or using pliers) and pull straight away from the sprinkler face to remove the protective cap.

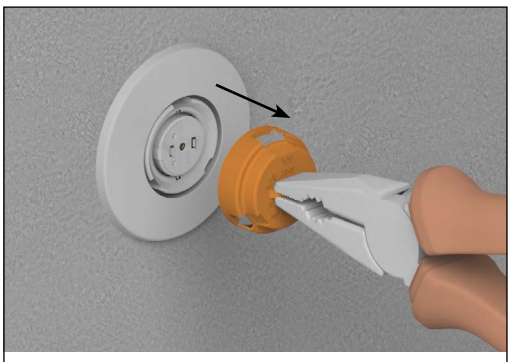

Figure 5: Removing the Protective Cap

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⚠ **Ensure the escutcheon plate is tight against the ceiling.**

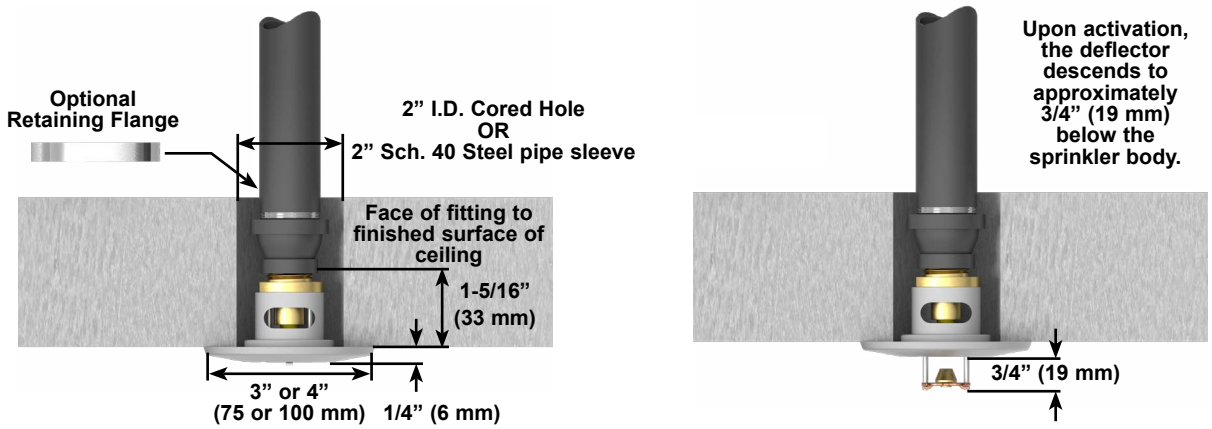

Figure 6: Installation Dimensions - Pendent

⚠ **Ensure the escutcheon plate is tight against the wall.**

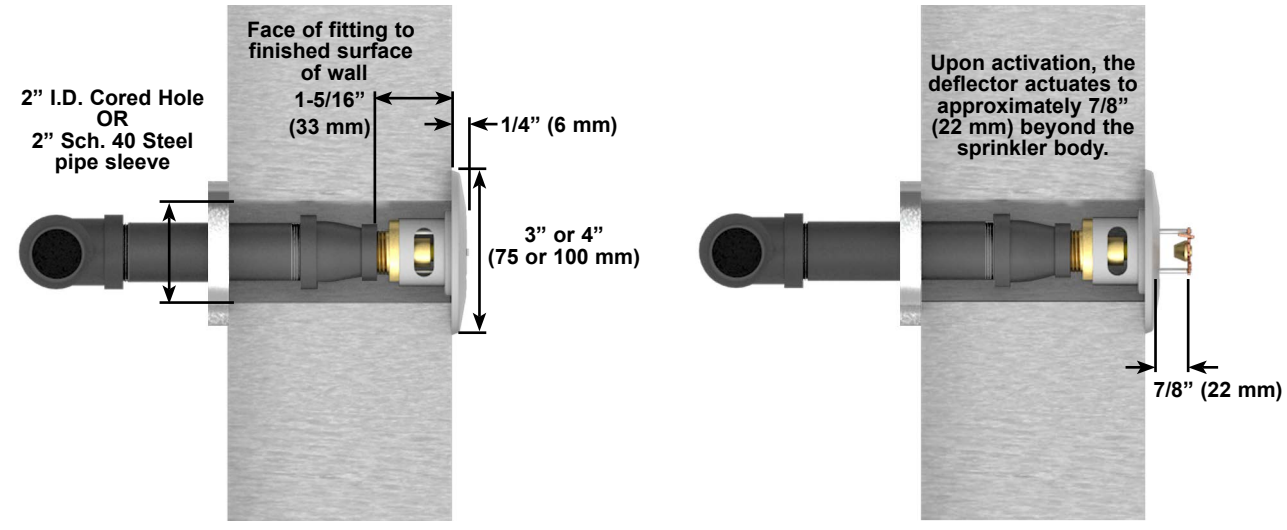

Figure 7: Installation Dimensions - HSW

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5. OPERATION

The sprinkler is recessed into the mounting surface, flush to the wall, with only a portion of the fusible link assembly exposed beyond the wall. The concealed deflector is held inside the sprinkler body until the eutectic metal solder link is fused. When the sprinkler fuses, the deflector extends to discharge and distribute water.
The special escutcheon plates shown on this document are the only escutcheon rings that may be used with these institutional sprinklers, and all of these sprinklers must be installed with an escutcheon plate.

The sprinkler piping behind the wall leading to the sprinkler must be secured to prevent any movement of the sprinkler. One method of anchoring the pipe behind the wall is to use the retaining flange and screw assembly that are available from Viking. The flange slides over the sprinkler nipple prior to threading the nipple into the tee.

6. INSPECTIONS, TESTS AND MAINTENANCE

NOTICE

The owner is responsible for maintaining the fire protection system and devices in proper operating condition. For minimum maintenance and inspection requirements, refer to NFPA 25 for Inspection, Testing and Maintenance requirements. In addition, the Authority Having Jurisdiction may have additional maintenance requirements that must be followed.

A. The sprinklers must be inspected on a regular basis for corrosion, mechanical damage, obstructions, paint, etc. The frequency of inspections may vary due to corrosive atmospheres, water supplies, and activity around the device.
B. Sprinklers that have been painted or mechanically damaged must be replaced immediately. Sprinklers showing signs of corrosion shall be tested and/or replaced immediately as required. Installation standards require sprinklers to be tested and, if necessary, replaced after a specified term of service. Refer to the installation standards and the Authority Having Jurisdiction for the specified period of time after which testing and/or replacement is required. Sprinklers that have operated cannot be reassembled or reused, but must be replaced. When replacing sprinklers, use only new sprinklers.
C. The sprinkler discharge pattern is critical for proper fire protection. Nothing should be hung from the sprinkler, attached to it, or otherwise obstruct the discharge pattern. All obstructions must be immediately removed or, if necessary, additional sprinklers installed.
D. When replacing existing sprinklers, the system must be removed from service. Refer to the appropriate system description and/or valve instructions. Prior to removing the system from service, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the affected area.

7. AVAILABILITY

Viking Institutional Sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

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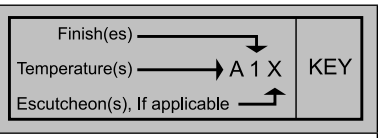
APPROVAL CHART
Viking Institutional Sprinklers



Sprinkler Base Part Number[1]	SIN	Thread Size		Listings and Approvals[2,4]	
		NPT Inch	BSPT mm	cULus (Quick Response)	FM (Standard Response)
19663	VK426	1/2	--	A1	-
20110	VK426	--	15	A1	-
22885	VK427	1/2	--	A1	A1
22908	VK427	--	15	A1	A1
19876	VK650	1/2	--	A1	-
20111	VK650	--	15	A1	-
22884	VK651	1/2	--	A1	-
22907	VK651	--	15	A1	-

Approved Temperature Rating Codes:
A = 165 °F (74 °C) and 205 °F (96 °C)

Approved Finish Codes:
1 = Chrome, Painted White[3], and Painted Gray[3] (RAL9006)

Footnotes

1 Base Part number is shown. For complete part number, refer to Viking's current price schedule.
2 This table shows the listings and approvals available at the time of printing. Check with the manufacturer for any additional approvals.
3 Other colors are available upon request with the same Listings and Approvals as the standard colors.
4 Refer to the applicable cULus or FM Design Criteria in this document for further details.

cULus LISTED FLOW RATES AND COVERAGE AREAS (LIGHT HAZARD) FOR
Viking EXTENDED COVERAGE Institutional Sprinklers

Sprinkler Base Part Number[1]	SIN	Thread Size		cULus Listed Flows and Pressures				
		NPT Inch	BSPT mm	Coverage Area Ft x Ft. (m x m)	Minimum Flow[1] GPM (Lpm)	Minimum Pressure[2] PSI (bar)	Deflector to Ceiling Distance Inches (mm)	Minimum Spacing Ft. (m)
19876	VK650	1/2	--	16 x 16 (4,9 x 4,9)	26 (96)	21.6 (1,49)	Flush[3]	8 (2,4)
20111	VK650	--	15	16 x 16 (4,9 x 4,9)	26 (96)	21.6 (1,49)	Flush[3]	8 (2,4)
22884	VK651	1/2	--	16 x 16 (4,9 x 4,9)	26 (96)	21.6 (1,49)	4 to 12 (102 to 304)	8 (2,4)
22907	VK651	--	15	16 x 16 (4,9 x 4,9)	26 (96)	21.6 (1,49)	4 to 12 (102 to 304)	8 (2,4)

Footnotes

1 Based on the minimum flow in GPM (lpm) from each sprinkler.
2 Based on Nominal K-factor.
3 The sprinkler face protrudes downward from the ceiling 1/4" (6 mm). See Figure 6.

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DESIGN CRITERIA - UL

STANDARD COVERAGE PENDENT
cULus Listing Requirements:

The sprinkler VK426 is cULus Listed as a Quick Response, Flush, Pendent Sprinkler as indicated in the Approval Chart for installation in accordance with the latest edition of NFPA 13. The following requirements must be followed:

- Designed for use in Light and Ordinary Hazard occupancies.
- The sprinkler must be installed in the pendent position in fixed fire protection systems (wet, dry, deluge, or preaction systems).
- Protection areas and maximum spacing shall be in accordance with the tables provided in NFPA 13.
- Minimum spacing allowed is 6 ft. (1.8 m) unless baffles are installed in accordance with NFPA 13.
- Minimum distance from walls is 4 in. (100 mm).
- Maximum distance from walls shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler installation and obstruction rules contained in NFPA 13 for standard coverage pendent spray sprinklers must be followed.

EXTENDED COVERAGE PENDENT
cULus Listing Requirements:

The sprinkler VK650 is cULus Listed as an Extended Coverage, Quick Response, Flush, Pendent Sprinkler as indicated in the Approval Chart for installation in accordance with the latest edition of NFPA 13. The following requirements must be followed:

- Designed for use in Light Hazard occupancies only.
- The sprinkler must be installed in the pendent position in fixed fire protection systems (wet, dry, deluge, or preaction systems).
- Minimum spacing allowed is 8 ft. (2.4 m) unless baffles are installed in accordance with NFPA 13.
- Maximum protection area allowed is 16' x 16' (4.9 m x 4.9 m).
- Minimum distance from walls is 4 in. (100 mm).
- Maximum distance from walls shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler installation and obstruction rules contained in NFPA 13 for extended coverage pendent spray sprinklers must be followed.

STANDARD COVERAGE HORIZONTAL SIDEWALL
cULus Listing Requirements:

The sprinkler VK427 is cULus Listed as a Quick Response, Flush, Horizontal Sidewall Sprinkler as indicated in the Approval Chart for installation in accordance with the latest edition of NFPA 13. The following requirements must be followed:

- Designed for use in Light and Ordinary Hazard occupancies below smooth, flat, horizontal ceilings.
- The sprinkler must be installed in the horizontal sidewall position in fixed fire protection systems (wet, dry, deluge, or preaction systems).
- Orient the top of the deflector parallel with the ceiling. The wrench is marked with the word "top".
- Must be located with deflector 4" to 12" (102 mm to 304 mm) below the ceiling, and flush with the wall in which they are installed.
- Protection areas and maximum spacing shall be in accordance with the tables provided in NFPA 13.
- Minimum spacing allowed is 6 ft. (1.8 m) unless baffles are installed in accordance with NFPA 13.
- Minimum distance from end walls is 4 in. (102 mm).
- Maximum distance from end walls shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler installation and obstruction rules contained in NFPA 13 for standard coverage sidewall spray sprinklers must be followed.

EXTENDED COVERAGE HORIZONTAL SIDEWALL
cULus Listing Requirements:

The sprinkler VK651 is cULus Listed as an Extended Coverage, Quick Response, Flush, Horizontal Sidewall Sprinkler as indicated in the Approval Chart for installation in accordance with the latest edition of NFPA 13. The following requirements must be followed:

- Designed for use in Light Hazard occupancies only below smooth, flat, horizontal ceilings.
- The sprinkler must be installed in the horizontal sidewall position in fixed fire protection systems (wet, dry, deluge, or preaction systems).
- Orient the top of the deflector parallel with the ceiling. The wrench is marked with the word "top".
- Must be located with deflector 4" to 12" (102 mm to 304 mm) below the ceiling, and flush with the wall in which they are installed.
- Maximum protection area allowed is 16' x 16' (4.9 m x 4.9 m).
- Maximum spacing shall be in accordance with the tables provided in NFPA 13.
- Minimum spacing allowed is 8 ft. (2.4 m) unless baffles are installed in accordance with NFPA 13.
- Minimum distance from end walls is 4 in. (102 mm).
- Maximum distance from end walls shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler installation and obstruction rules contained in NFPA 13 for extended coverage sidewall spray sprinklers must be followed.

IMPORTANT: Always refer to Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking Technical Data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

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DESIGN CRITERIA - FM

FM Approval Requirements:
The Viking Standard Response Horizontal Sidewall Sprinkler VK427 is FM Approved as standard response sidewall Non-Storage sprinkler, as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including 2-0) and Technical Advisory Bulletins. FM Global Loss Prevention Data Sheets and Technical Advisory Bulletins contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.

NOTE: The FM installation guidelines may differ from cULus and/or NFPA criteria

IMPORTANT: Always refer to Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking Technical Data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

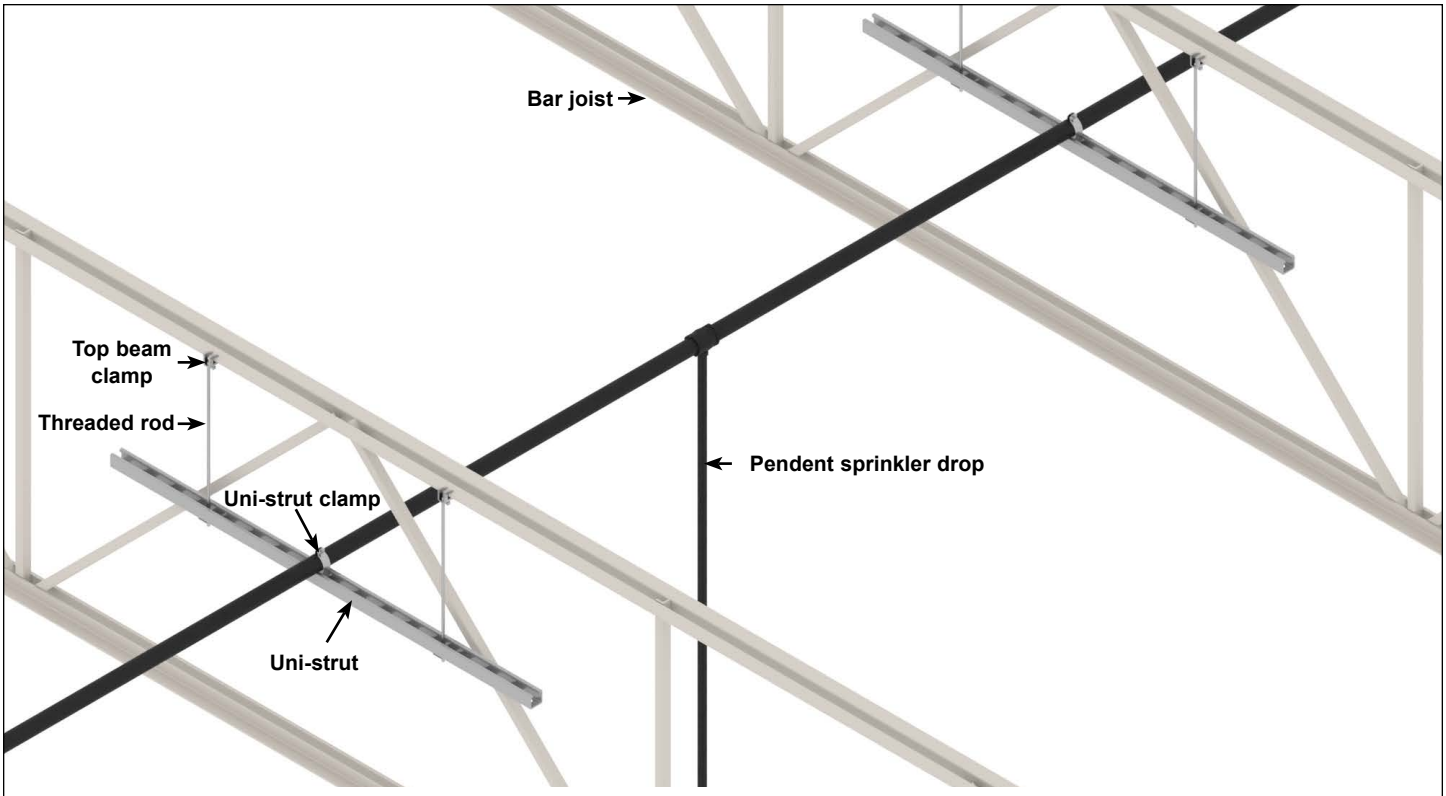

Figure 8: Alternative Bracing Method

NOTICE

Specific situations and conditions may exist that require alternative bracing methods to be used. Additional bracing methods may also be used; the material(s) used must not break down, drip, over-spray, or otherwise interfere with or impede the operation of the sprinkler—especially during fire conditions.

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Before installation, be sure to have the appropriate sprinkler model and style, with the correct K-Factor, temperature rating, and response characteristics. Sprinklers must be installed after the piping is in place to prevent mechanical damage. Keep sprinklers with protective caps or bulb shields contained within the caps or shields during installation and testing, and any time the sprinkler is shipped or handled.

1a. For frame-style sprinklers, install escutcheon (if used), which is designed to thread onto the external threads of the sprinkler. Refer to the appropriate sprinkler data page to determine approved escutcheons for use with specific sprinkler models.

1b. For flush and concealed style sprinklers: Cut the sprinkler nipple so that the ½" or 3/4" (15 mm or 20 mm)* NPT outlet of the reducing coupling is at the desired location, and centered in the opening* in the ceiling or wall.
*Size depends on the sprinkler model used. Refer to the sprinkler technical data page.

2. Apply a small amount of pipe-joint compound or tape to the external threads of the sprinkler only, taking care not to allow a build-up of compound in the sprinkler inlet. **NOTE:** Sprinklers with protective caps or bulb shields must have the caps or shields kept on them when applying pipe-joint compound or tape. *Exception: For domed concealed sprinklers, remove the protective cap for installation, and then place it back on the sprinkler temporarily..*

3. Refer to the appropriate sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used. DO NOT use the deflector or fusible element to start or thread the sprinkler into a fitting.
   a. Install the sprinkler onto the piping using the special sprinkler wrench only, taking care not to over-tighten or damage the sprinkler.
   b. For flush and concealed style sprinklers: the internal diameter of the special sprinkler installation wrench is designed for use with the sprinkler contained in the protective cap. *Exception: For domed concealed sprinklers, remove the protective cap for installation, and then place it back on the sprinkler temporarily.* Thread the flush or concealed sprinkler into the ½" or 3/4" (15 mm or 20 mm)* NPT outlet of the coupling by turning it clockwise with the special sprinkler wrench. *Thread size depends on the particular sprinkler model used. Refer to the sprinkler technical data page.

C. Installation Instructions - Dry Sprinklers

WARNING: Viking dry sprinklers are to be installed in the 1" outlet (for dry and preaction systems), or run of malleable, ductile iron, or Nibco CPVC* threaded tee fittings (for wet systems) that meet the dimensional requirements of ANSI B16.3 (Class 150), or cast iron threaded tee fittings that meet the dimensional requirements of ANSI B16.4 (Class 125), even at branch line ends. The threaded end of the dry sprinkler is designed to allow the seal to penetrate and extend into the fitting to a predetermined depth. This prevents condensation from accumulating and freezing over the sprinkler seal. ***NOTE: When using CPVC fittings with Viking dry sprinklers, use only new Nibco Model 5012-S-BI. When selecting other CPVC fittings, contact Viking Technical Services.**

1. **DO NOT** install the dry sprinkler into a threaded elbow, coupling, or any other fitting that could interfere with thread penetration. Such installation would damage the brass seal.
2. **DO NOT** install dry sprinklers into couplings or fittings that would allow condensation to accumulate above the seal when the sprinkler is located in an area subject to freezing.
3. **NEVER** try to modify dry sprinklers. They are manufactured for specific "A" or "B" dimensions and cannot be modified.

The dry sprinkler must be installed after the piping is in place to prevent mechanical damage. Before installation, be sure to have the correct sprinkler model and style, with the appropriate "A" or "B" dimension(s), temperature rating, orifice size, and response characteristics. Keep sprinklers with protective caps or bulb shields contained within the caps or shields during installation and testing, and any time the sprinkler is shipped or handled. *Exception:* For concealed and adjustable recessed dry sprinklers, the protective caps and shields are removed for installation.

To install the dry sprinkler, refer to the instructions below and the appropriate sprinkler technical data page for illustrated instructions.

Dry upright sprinklers must be installed above the piping, in the upright position only. When installing dry upright or plain barrel style vertical sidewall sprinklers on piping located close to the ceiling, it may be necessary to lower the sprinkler into the fitting from above the ceiling. When installing dry upright or plain barrel vertical sidewall sprinklers from below the ceiling, verify that the opening in the ceiling is a minimum 1-1/2" (38.1 mm) in diameter.

For dry upright or plain barrel vertical sidewall sprinklers in the upright position: First, install the escutcheon (if used) over the threaded end of the sprinkler barrel. Slide the escutcheon past the external threads. NOTE: When installing the dry upright or plain barrel vertical sidewall sprinkler from above the ceiling, it will be necessary to install the escutcheon after lowering the threaded end of the sprinkler through the ceiling penetration.

A. **For all dry sprinklers:** Apply a small amount of pipe-joint compound or tape to the external threads of the sprinkler barrel only, taking care not to allow a build-up of compound or tape over the brass inlet and seal. **NOTE:** Sprinklers with protective caps or bulb shields must be contained within the caps or shields before applying pipe-joint compound or tape.

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B. Refer to the appropriate sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used.
C. Install the dry sprinkler on the piping using the special dry sprinkler wrench only, while taking care not to damage the sprinkler. **NOTE:** Thread the sprinkler into the fitting hand tight, plus 1/2 turn with the dry sprinkler wrench.
D. *For adjustable standard and adjustable recessed dry pendent and sidewall sprinklers: Escutcheons can be installed after the sprinklers have been installed onto the piping. Refer to the appropriate sprinkler technical data page for escutcheon installation instructions and illustrations.*

D. Installation Instructions - Testing

4. After installation, the entire sprinkler system must be tested. The test must be conducted to comply with the installation standards. Viking *high pressure* sprinklers may be hydrostatically tested at a maximum of 300 psi (20.7 bar) for limited periods of time (two hours), for the purpose of acceptance by the Authority Having Jurisdiction.
   a. Make sure the sprinkler is properly tightened. If a thread leak occurs, normally the sprinkler must be removed, new pipe-joint compound or tape applied, and then reinstalled. This is due to the fact that when the joint seal is damaged, the sealing compound or tape is washed out of the joint. Air testing [do not exceed 40 psi (2.76 bar)] the sprinkler piping prior to testing with water may be considered in areas where leakage during testing must be prevented. Refer to the Installation Standards and the Authority Having Jurisdiction.
   b. **Remove plastic protective sprinkler caps or bulb shields AFTER the wall or ceiling finish work is completed where the sprinkler is installed and there no longer is a potential for mechanical damage to the sprinkler operating elements.** To remove the bulb shields, simply pull the ends of the shields apart where they are snapped together. To remove caps from frame style sprinklers, turn the caps slightly and pull them off the sprinklers. **SPRINKLER CAPS OR BULB SHIELDS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!** Retain a protective cap or shield in the spare sprinkler cabinet.
5. For flush style sprinklers: the ceiling ring can now be installed onto the sprinkler body. Align the ceiling ring with the sprinkler body and thread or push it on (depends on sprinkler model) until the outer flange touches the surface of the ceiling. Note the maximum adjustment is 1/4" (6.35 mm). DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler drop nipple as required.
6. For concealed sprinklers: the cover assembly can now be attached.
   a. Remove the cover from the protective box, taking care not to damage the cover plate assembly.
   b. Gently place the base of the cover plate assembly over the sprinkler protruding through the opening in the ceiling.
   c. Push the cover plate assembly onto the sprinkler until the unfinished brass flange of the cover plate base (or the cover adapter, if used) touches the surface of the ceiling.
   d. Refer to the applicable technical data sheet to determin the maximum adjustment available for concealed sprinklers. DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler drop nipple.

NOTE: If it is necessary to remove the entire sprinkler unit, the system must be taken out of service. See section 6. INSPECTIONS, TESTS AND MAINTENANCE and follow all warnings and instructions.

5. OPERATION

Refer to the appropriate sprinkler technical data page(s). During fire conditions, the operating element fuses or shatters (depending on the type of sprinkler), releasing the pip cap and sealing assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. The sprinkler technical data page may contain installation requirements specific for the sprinkler model selected. The use of certain types of sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction prior to installation.

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6. INSPECTIONS, TESTS AND MAINTENANCE

NOTICE: Refer to NFPA 25 for Inspection, Testing and Maintenance requirements. **NOTICE:** The owner is responsible for having the fire-protection system and devices inspected, tested, and maintained in proper operating condition in accordance with this guide, and applicable NFPA standards. In addition, the Authority Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

A. Sprinklers must be inspected on a regular basis for corrosion, mechanical damage, obstructions, paint, etc. Frequency of inspections may vary due to corrosive atmospheres, water supplies, and activity around the sprinkler unit.

B. Sprinklers or cover plate assemblies that have been field painted, caulked, or mechanically damaged must be replaced immediately. Sprinklers showing signs of corrosion shall be tested and/or replaced immediately as required. Installation standards require sprinklers to be tested and, if necessary, replaced after a specified term of service. Refer to NFPA 25 and the Authority Having Jurisdiction for the specified period of time after which testing and/or replacement is required. Never attempt to repair or reassemble a sprinkler. Sprinklers and cover assemblies that have operated cannot be reassembled or re-used, but must be replaced. When replacement is necessary, use only new sprinklers and cover assemblies with identical performance characteristics.

C. The sprinkler discharge pattern is critical for proper fire protection. Therefore, nothing should be hung from, attached to, or otherwise obstruct the discharge pattern. All obstructions must be immediately removed or, if necessary, additional sprinklers installed.

D. When replacing existing sprinklers, the system must be removed from service. Refer to the appropriate system description and/or valve instructions. Prior to removing the system from service, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the affected area.

1. Remove the system from service, drain all water, and relieve all pressure on the piping.

2a. For frame-style sprinklers, use the special sprinkler wrench to remove the old sprinkler by turning it counterclockwise to unthread it from the piping.

2b. For flush and concealed style sprinklers: Remove the ceiling ring or cover plate assembly before unthreading the sprinkler body from the piping. Ceiling rings and cover plates can be removed either by gently unthreading them or pulling them off the sprinkler body (depends on the sprinkler model used). After the ceiling ring or cover plate assembly has been removed from the sprinkler body, place the plastic protective cap (from the spare sprinkler cabinet) over the sprinkler to be removed and then fit the sprinkler wrench over the cap. Then use the wrench to unthread the sprinkler from the piping. *Exception: Domed concealed sprinklers are removed without the plastic cap.*

3. Install the new sprinkler unit by following the instructions in section 4. INSTALLATION. Care must be taken to ensure that the replacement sprinkler is the proper model and style, with the correct K-Factor, temperature rating, and response characteristics. A fully stocked spare sprinkler cabinet should be provided for this purpose. For flush or concealed sprinklers: stock of spare ceiling rings or cover plates should also be available in the spare sprinkler cabinet.

E. Place the system back in service and secure all valves. Check for and repair all leaks. Sprinkler systems that have been subjected to a fire must be returned to service as soon as possible. The entire system must be inspected for damage, and repaired or replaced as necessary. Sprinklers that have been exposed to corrosive products of combustion or high ambient temperatures, but have not operated, should be replaced. Refer to the Authority Having Jurisdiction for minimum replacement requirements.

7. AVAILABILITY

Viking sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TECHNICAL DATA — SPRINKLER OVERVIEW

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1. DESCRIPTION

Viking fire sprinklers consist of a threaded frame with a specific waterway or orifice size and a deflector for distributing water in a specified pattern. A closed or sealed sprinkler refers to a complete assembly, including the thermosensitive operating element. An open sprinkler does not use an operating element and is open at all times. The distribution of water is intended to extinguish a fire or to control its spread.

Viking sprinklers are available in several models and styles. Refer to specific sprinkler technical data pages for available styles, finishes, temperature ratings, thread sizes, and nominal K-Factors for the particular model selected.

2. LISTINGS AND APPROVALS

Refer to the Approval Charts on the appropriate sprinkler technical data page(s) and/or approval agency listings.

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

3. TECHNICAL DATA

Pressure Ratings:

Maximum allowable water working pressure is 175 psig (12 Bar) unless rated and specified for high water working pressure [250 psig (17.2 bar)].

Sprinkler Identification:

Viking sprinklers are identified and marked with the word “Viking”, the sprinkler identification number (SIN) consisting of “VK” plus a three digit number*, the model letter, and the year of manufacture.

Available Finishes:

Viking sprinklers are available in several decorative finishes. Some models are available with corrosion-resistant coatings or are fabricated from non-corrosive material. Refer to the sprinkler technical data page for additional information.

Available Temperature Ratings:

Viking sprinklers are available in several temperature ratings that relate to a specific temperature classification. Applicable installation rules mandate the use and limitations of each temperature classification. In selecting the appropriate temperature classification, the maximum expected ceiling temperature must be known. When there is doubt as to the maximum temperature at the sprinkler location, a maximum-reading thermometer should be used to determine the temperature under conditions that would show the highest readings to be expected. In addition, recognized installation rules may require a higher temperature classification, depending upon sprinkler location, occupancy classification, commodity classification, storage height, and other hazards. In all cases, the maximum expected ceiling temperature dictates the lowest allowable temperature classification. Sprinklers located immediately adjacent to a heat source may require a higher temperature rating.

K-Factors:

Viking sprinklers are available in several orifice sizes with related K-Factors. The orifice is a tapered waterway and, therefore, the K-Factor given is nominal. Nominal U.S. K-Factors are provided in accordance with the 1999 edition of NFPA 13, Section 3-2.3. Refer to the specific data page for appropriate K-Factor information.

Available Styles:

Viking sprinklers are available for installation in several positions as indicated by a stamping on the deflector. The deflector style dictates the appropriate installation position of the sprinkler; it breaks the solid stream of water issuing from the sprinkler orifice to form a specific spray pattern. The following list indicates the various styles and identification of Viking sprinklers.

UPRIGHT SPRINKLER: A sprinkler intended to be installed with the deflector above the frame so water flows upward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. Marked “SSU” (Standard Sprinkler Upright) or “UPRIGHT” on the deflector.

PENDENT SPRINKLER: A sprinkler intended to be oriented with the deflector below the frame so water flows downward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. Marked “SSP” (Standard Sprinkler Pendent) or “PENDENT” on the deflector.

Viking Technical Data may be found on The Viking Corporation’s Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

CONVENTIONAL SPRINKLER: An “old style” sprinkler intended to be installed with the deflector in either the upright or pendent position. The deflector provides a spherical type pattern with 40 to 60 percent of the water initially directed downward and a proportion directed upward. Must be installed in accordance with installation rules for conventional or old style sprinklers. DO NOT USE AS A REPLACEMENT FOR STANDARD SPRAY SPRINKLERS. Marked “C U/P” (Conventional Upright/Pendent) on the deflector.

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VERTICAL SIDEWALL (VSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The deflector provides a water spray pattern outward in a quarter-spherical pattern and can be installed in the upright or pendent position with the flow arrow in the direction of discharge. Marked “SIDEWALL” on the deflector with an arrow and the word “FLOW”. (Note: Some vertical sidewall sprinklers can only be installed in the upright or pendent position—in this case, the sprinkler will also be marked “UPRIGHT” or “PENDENT”.)

HORIZONTAL SIDEWALL (HSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The special deflector provides a water spray pattern outward in a quarter-spherical pattern. Most of the water is directed away from the nearby wall with a small portion directed at the wall behind the sprinkler. The top of the deflector is oriented parallel with the ceiling or roof. The flow arrows point in the direction of discharge. Marked “SIDEWALL” and “TOP” with an arrow and the word “FLOW”.

EXTENDED COVERAGE (EC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listings. Maximum area of coverage, minimum flow rate, orifice size, and nominal K-Factor are specified in the individual listings. EC sprinklers are intended for Light-Hazard occupancies with smooth, flat, horizontal ceilings unless otherwise specified. In addition to the above markings, the sprinkler is marked “EC”.

QUICK RESPONSE (QR) SPRINKLER: A spray sprinkler with a fast- actuating operating element. The use of quick response sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction (AHJ) prior to installing.

QUICK RESPONSE EXTENDED COVERAGE (QREC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listing. This is a sprinkler with an operating element that meets the criteria for quick response. QREC sprinklers are only intended for Light Hazard occupancies. The sprinkler is marked “QREC”.

FLUSH SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The unit is mounted flush with the ceiling or wall, with the fusible link exposed. Upon actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

CONCEALED SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The sprinkler is hidden from view by a cover plate installed flush with the ceiling or wall. During fire conditions, the cover plate detaches, and upon sprinkler actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

RECESSED SPRINKLER: A spray sprinkler assembly intended for installation with a concealed piping system. The assembly consists of a sprinkler installed in a decorative adjustable recessed escutcheon that minimizes the protrusion of the sprinkler beyond the ceiling or wall without adversely affecting the sprinkler distribution or sensitivity. Refer to the appropriate technical data page for allowable sprinkler models, temperature ratings, and occupancy classifications. DO NOT RECESS ANY SPRINKLER NOT LISTED FOR USE WITH THE ESCUTCHEON.

CORROSION-RESISTANT SPRINKLER: A special service sprinkler with non-corrosive protective coatings, or that is fabricated from non-corrosive material, for use in atmospheres that would normally corrode sprinklers.

DRY SPRINKLER: A special-service sprinkler intended for installation on dry pipe systems or wet pipe systems where the sprinkler is subject to freezing temperatures. The unit consists of a sprinkler permanently secured to an extension nipple with a sealed inlet end to prevent water from entering the nipple until the sprinkler operates. The unit MUST be installed in a tee fitting. Dry upright sprinklers are marked with the “B” dimension [distance from the face of the fitting (tee) to the top of the deflector]. Dry pendent and sidewall sprinklers are marked with the “A” dimension [the distance from the face of fitting (tee) to the finished surface of the ceiling or wall].

LARGE DROP SPRINKLER: A type of special application sprinkler used to provide fire control of specific high-challenge fire hazards. Large drop sprinklers are designed to produce an umbrella-shaped spray pattern downward with a higher percentage of “large” water droplets than standard spray sprinklers. The sprinkler has an extra-large orifice with a nominal K-Factor of 11.2. Marked “HIGH CHALLENGE” and “UPRIGHT”.

EARLY SUPPRESSION FAST-RESPONSE (ESFR) SPRINKLER: A sprinkler intended to provide fire suppression of specific high-challenge fire hazards through the use of a fast response fusible link, 14.0, 16.8, or 25.2 nominal K-Factor, and special deflector. ESFR sprinklers are designed to produce high-momentum water droplets in a hemispherical pattern below the deflector. This permits penetration of the fire plume and direct wetting of the burning fuel surface while cooling the atmosphere early in the development of a high-challenge fire. Marked “ESFR” and “UPRIGHT” or “PEND”.

INTERMEDIATE LEVEL/RACK STORAGE SPRINKLER: A standard spray sprinkler assembly designed to protect its operating element from the spray of sprinklers installed at higher elevations. The assembly consists of a standard or large orifice upright or pendent sprinkler with an integral upright or pendent water shield and guard assembly. Use only those sprinklers that have been tested and listed for use with the assembly. Refer to the technical data page for allowable sprinkler models.

RESIDENTIAL SPRINKLER: A sprinkler intended for use in the following occupancies: one- and two-family dwellings with the fire protection sprinkler system installed in accordance with NFPA 13D; residential occupancies up to four stories in height with the fire protection system installed in accordance with NFPA 13R; and where allowed by the Authority Having Jurisdiction in residential portions of any occupancy with the fire protection system installed in accordance with NFPA 13.

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Residential sprinklers have a unique distribution pattern and utilize a “fast response” heat sensitive operating element. They enhance survivability in the room of fire origin and are designed to provide a life safety environment for a minimum of ten minutes. For this reason, residential sprinklers must not be used to replace standard sprinklers unless tested for and approved by the Authority Having Jurisdiction. In addition to standard markings, the unit is identified as “RESIDENTIAL SPRINKLER” or “RES”.

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

Refer to the appropriate sprinkler technical data page(s).

6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

Viking sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking’s current list price schedule or contact Viking directly.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers and the appropriate sprinkler general care, installation, and maintenance guide. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. The sprinkler technical data page may contain installation requirements specific for the sprinkler model selected. The use of certain types of sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction prior to installation.

VIKING®

BULLETIN

REGULATORY AND HEALTH WARNINGS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
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1. DESCRIPTION

Regulatory and Health Warnings applying to materials used in the manufacture and construction of fire protection products are provided herin as they relate to legally mandated jurisdictional regions.

⚠ WARNING

STATE OF CALIFORNIA, USA

Installing or servicing fire protection products such as sprinklers, valves, piping etc. can expose you to chemicals including, but not limited to, lead, nickel, butadiene, titaninum dioxide, chromium, carbon black, and acrylonitrile which are known to the State of California to cause cancer or birth defects or other reproductive harm.

For more information, go to **www.P65Warnings.ca.gov**

2. WARRANTY TERMS AND CONDITIONS

For details of warranty, refer to Viking's current list price schedule at **www.vikinggroupinc.com** or contact Viking directly.

Fig. 20XXT Standard Tall Hose

c UL us LISTED FM APPROVED

Fig. 20XXT cULus & FM Approved Brackets

Bracket Fig # & Size	cULus Listed	FM Approved	FlexHead Historical Model Number
BKT-MPO	✓	✓	MPO24BKT2
BKT-MPT	✓	✓	MPT24BKT1
BKT-ADO, 16 in	✓	✓	ADO16BKT3
BKT-ADO, 24 in	✓	✓	ADO24BKT3
BKT-ADO, 30 in		✓	ADO30BKT3
BKT-ADO, 48 in		✓	ADO48BKT3
BKT-UHO3		✓	UHO-3
BKT-TZ		✓	SPO6TZBKT2

Notes: Flexhead Historical Model Numbers may be used to verify cULus Listings & FM Approvals.

Specifications

Assembly Length

24 in 36 in 48 in
60 in 72 in

Outlet Drop Size (NPT per ASME B1.20.1)

½ NPS (DN15) ¾ NPS (DN20)

Inlet Pipe Size (NPT per ASME B1.20.1)

1 NPS (DN25)

Pressure Rating

UL: 175 psi (1,205 kPa)
FM: 175 psi (1,205 kPa)

Minimum Bend Radius

UL: 3.0 in (76.2 mm)
FM: 8.0 in (203.2 mm)

Ambient Temperature

300°F (145°C) Max

Material

304 Stainless Steel

Features

- 100% Leak Tested Fully Welded Design
- Pre-Installed Sprinkler Head option available upon request
- Compliant with NFPA 13, 13R, & 13D
- For Wet, Dry, and Pre-Action Sprinkler Systems

Ordering

Specify figure number, length, outlet size, outlet drop length, and description.

FLEXHEAD
An ASC Engineered Solution

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

Fig. 20XXT Standard Tall Hose

Fig. 20XXT cULus Listing per UL 2443 & FM Approval (Listing) per FM 1637

Outlet Drop Size	Asembly Length	Equivalent Length						Max # of 90° Bends	
		UL	FM					UL	FM
			k = 5.6	k = 8.0	k = 11.2	k = 14.0	k = 16.8		
–	In	ft/m	ft/m	ft/m	ft/m	ft/m	ft/m		
½ NPS DN15	24	11 3.4	18.4 5.6	7.7 2.3	7.6 2.3	–	–	3	1
	36	16 4.9	26.6 8.1	11.5 3.5	11.5 3.5	–	–	3	2
	48	24 7.3	30.3 9.2	15.3 4.6	15.4 4.7	–	–	4	3
	60	29 8.8	35.8 10.9	19.1 5.8	19.3 5.9	–	–	4	4
	72	35 10.7	45.6 13.9	23.0 7.0	23.2 7.1	–	–	4	4
¾ NPS DN20	24	12 3.7	–	7.3 2.2	5.9 1.8	14.7 4.5	7.1 2.2	3	1
	36	18 5.5	–	21.5 6.5	10.4 3.1	21.8 6.6	10.9 3.3	3	2
	48	23 7.0	–	30.5 9.3	14.9 4.5	29.0 8.8	14.8 4.5	4	3
	60	29 8.8	–	39.5 12.0	19.4 5.9	36.1 11.0	18.7 5.7	4	4
	72	32 9.8	–	48.5 14	24.0 7.3	43.2 13.1	22.6 6.9	4	4

1. Equivalent Length of NPS 1 (DN25) Sch 40 Pipe.
2. Equivalent Lengths listed above assume the maximum number of 90° bends.
3. A 90° bend can be achieved with two 45° bends or three 30° bends.
4. UL Equivalent Lengths are listed for installation with sprinklers with a maximum k-factor of 16.8.
5. FM Equivalent Lengths listed above include the Friction Loss of the Sprinkler.
6. UL Listed for "Limited Flexibility".

Fig. 20XXT Standard Tall Hose

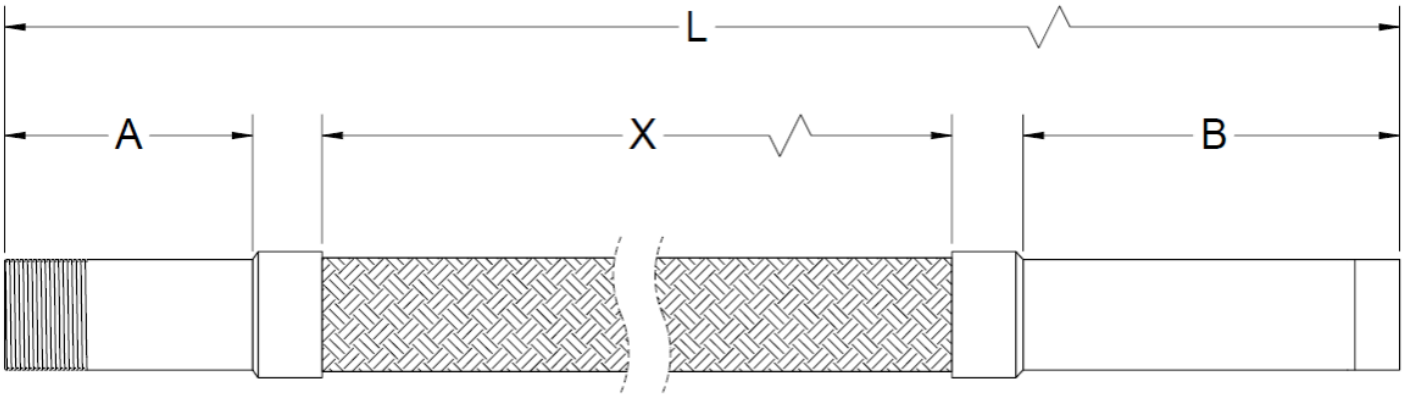

Fig. 20XXT cULus Listing per UL 2443 & FM Approval (Listing) per FM 1637

Asembly Length	True Length (L)		Braid Length (X)		Inlet Nipple Length (A)		Outlet Drop Length (B)		FlexHead Historical Model Number	
in	in	mm	in	mm	in	mm	in	mm	½ NPS Outlet	¾ NPS Outlet
24	24	610	15	381					2024T-50	2024T-75
36	36	914	37	940					2036T-50	2036T-75
48	48	1219	39	991	3.0	76.2	6.3	160.0	2048T-50	2048T-75
60	60	1524	51	1295					2060T-50	2060T-75
72	72	1829	63	1600					2072T-50	2072T-75

Fig. 20XXT Standard Tall Hose

Installation Instructions

Connection to the Branch

1. Apply pipe sealant or tape to the NPT thread.
2. Install into branch outlet. Tighten the assembly by placing the pipe wrench on the pipe nipple section.
3. **Note:** Only place the pipe wrench on the unthreaded portion of the inlet nipple.

Connection to the Sprinkler Head

1. Installation of the sprinkler head into the outlet drop shall be per the sprinkler manufacturer's installation instructions.

Connection to the Bracket

1. Installation of the hose to the bracket shall be per the bracket's installation instructions. The bracket shall be listed for installation with the 20XXT. See Page 1 for Listed and Approved brackets.

Bending the Hose

1. The hose may be bent to ensure the inlet nipple and outlet drop are in the desired locations.
2. The hose should never be bent to a radius less than minimum listed bend radius. The bend radius is defined to the center of the hose.
3. The hose must have at least one 90° bend. A 90° bend can be achieved with two 45° bends or three 30° bends.
4. For best performance, the bends in the hose should be as large and smooth as possible.

General Installation Notes

1. Never apply a wrench to the braided hose.
2. The Fig 20XXT may be installed in any direction from the branch.
3. If installing a sprinkler to a bracket after installation, it is best practice to prevent twisting of the bracket and hose by holding the outlet drop with a wrench.

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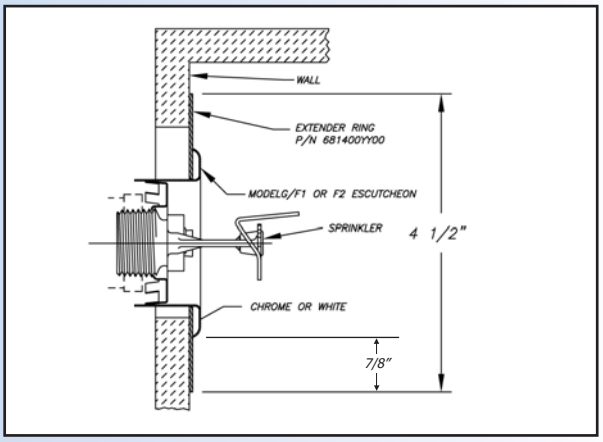
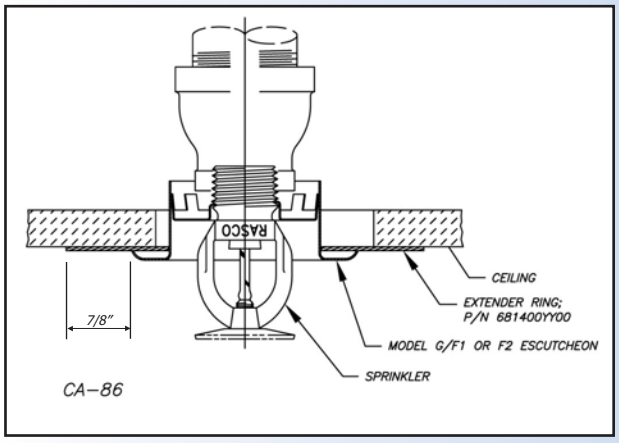
Escutcheon Extender Ring for Seismic Applications





Sprinkler Trim	Part Number	Outside Diameter	Inside Diameter	Color
Recessed Escutcheon: F1, F2, FV	6814002100	4-1/2	1-15/16	Chrome
	6814001500	4-1/2	1-15/16	White
	6814042100	*5-1/2	1-15/16	Chrome
	6814041500	*5-1/2	1-15/16	White
Recessed Escutcheon: FP & G	6814022100	4-1/2	2-7/16	Chrome
	6814021800	4-1/2	2-7/16	White
	6814032100	*5-1/2	2-7/16	Chrome
	6814031800	*5-1/2	2-7/16	White
Cover Plate: G4, G5, G6, RFC, RFS, SWC, & CCP	6814022100	4-1/2	2-7/16	Chrome
	6814021800	4-1/2	2-7/16	White
	6814032100	*5-1/2	2-7/16	Chrome
	6814031800	*5-1/2	2-7/16	White

** 5-1/2 inch diameter are made to order and may take up to 6 to 8 weeks.*

- Custom Colors are available upon request.
- For Custom Colors customer should supply paint samples.
- A set up charge is required for all custom orders.
- Allow 3 to 4 weeks for delivery.
- Contact your local Customer Service Department.

P/N 9999970319

10/21

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ASC Engineered Solutions

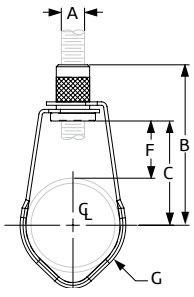
Adjustable Swivel Ring
Fig. 69

½" through 2" Size
Rounded Edge Design

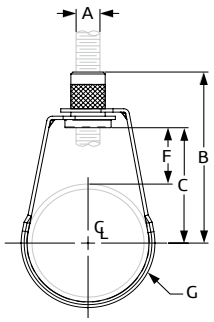
2½" through 8" Size

c UL us LISTED

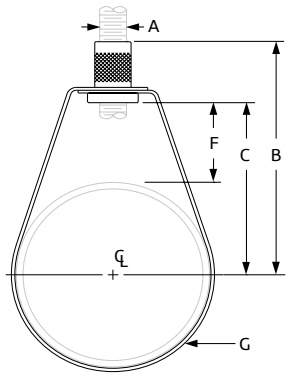
FM APPROVED



½" through 1" pipe



1¼" through 2" pipe



2½" through 8" pipe

Size Range: ½" through 8"

Material: Carbon steel

Finish: Strap is Pre-Galvanized Zinc Material. Nut is Zinc Plated.

Service: Recommended for suspension of non-insulated stationary pipe line.

Maximum Temperature: 450° F

Approvals: Complies with Federal Specification A-A-1192A (Type 10), WW-H-171-E (Type 10), and ANSI/MSS SP-58 (Type 10).
UL Listed and FM Approved (Sizes ¾" – 8").

Features:

- ½" – 2" sizes designed for use with steel and CPVC piping and manufactured with FBC System Compatible oil.
- 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 ½" through 6" sizes. The capture is permanent in the bottom portion of the band, allowing the hanger to be opened during installation if desired, but not allowing the nut to fall completely out.

Ordering:
Specify size, figure number and name.
Non-captured nut also available upon request.

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

Pipe Size	Max Load	Weight	Rod Size A	B	C	F	G Width
½	300	0.10	⅜	2⅞	2	1 9/16	⅝
¾		0.10		2¾	1⅞	1 5/16	
1		0.10		2 9/16	1 11/16	1	
1¼		0.10		2⅝	1¾	⅞	
1½		0.10		2¾	1⅞		
2		0.11		3¼	2⅜	1⅛	
2½	525	0.20		4	2¾	1 5/16	¾
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	½	5 5/16	4⅜		
6		0.65		6 11/16	5 9/16	2¼	
8		1.00		8 9/16	7 9/16	3¼	

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

The following excerpt are pages from the North American Product Technical Guide, Volume 2: Anchor Fastening, Edition 21.

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&CA: https://submittals.us.hilti.com/PTGVol2/

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.
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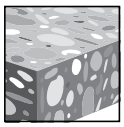
3.3.8 KWIK HUS-EZ I AND KWIK HUS-EZ E CARBON STEEL SCREW ANCHOR

PRODUCT DESCRIPTION

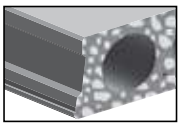
KWIK HUS EZ I and KWIK HUS-EZ E carbon steel anchors

Anchor System		Features and Benefits
	Carbon Steel 1/4", 3/8" KWIK HUS-EZ I	• OSHA compliant installation options including the Hilti SafeSet™ hollow drill bit technology • Easy installation using impact tool or torque wrench • Product and length identification marks facilitate quality control after installation • Thread design enables quality setting and exceptional load values in wide variety of base material strengths • 1/4" diameter available in internally and externally threaded head styles • Anchor is fully removable • Anchor diameter is same as drill bit diameter. No special diameter bit requiredt. • Suitable for reduced edge distances and spacing • Suitable for seismic and non-seismic areas
	Carbon Steel 1/4" KWIK HUS EZ E	

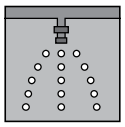


Uncracked concrete

Cracked concrete



Hollowcore concrete



Fire sprinkler listings

SafeSet™ System with Hollow Drill Bit

Profis Anchor design software

Approvals/Listings	
ICC-ES (International Code Council)	ESR-3027 in concrete per ACI 318 Ch. 17 / ACI 355.2/ ICC-ES AC193
City of Los Angeles	City of Los Angeles 2020 LABC Supplement (within ESR-3027)
FM (Factory Mutual)	Pipe hanger components for automatic sprinkler systems for KH-EZ I and KH-EZ E

INSTALLATION PARAMETERS

Table 1 — Hilti KWIK HUS-EZ I and KWIK HUS-EZ E specifications[1,2]

Setting information	Symbol	Units	Nominal anchor diameter					
			1/4					3/8
Head style			KH-EZ E	KH-EZ I				
Internal thread or external thread diameter		in.	3/8	1/4		3/8		1/2
Nominal bit diameter	d_{bit}	in.	1/4					3/8
Nominal embedment	h_{nom}	in.	1-5/8	1-5/8	2-1/2	1-5/8	2-1/2	2-1/8
Effective embedment	h_{ef}	in.	1.18	1.18	1.92	1.18	1.92	1.54
Minimum hole depth	h_o	in.	2	2	2-7/8	2	2-7/8	2-3/8
Installation torque	T_{inst}	ft-lb (N-m)	18 (24)					40 (54)
Wrench size		in.	1/2	3/8		1/2		11/16

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

2 See table 5 and figure 2 of section 3.3.6 for spacing, edge distance, and concrete thickness parameters

Figure 1 — KWIK HUS-EZ I anchor installation details

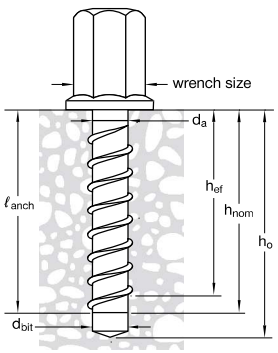
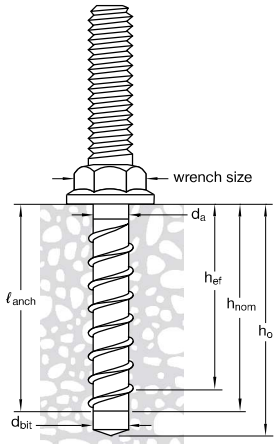


Figure 2 — KWIK HUS-EZ E anchor installation details



DESIGN INFORMATION IN CONCRETE PER ACI 318

ACI 318 Chapter 17 design

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

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

Nominal anchor diameter in.	Nominal embed. depth in. (mm)	Tension - ϕN_n							Shear - ϕV_n			
		f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 5,000 psi (34.5 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)	f'_c = 7,000 psi (48.3 MPa) lb (kN)	f'_c = 8,000 psi (55.2 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)
1/4	1-5/8	585	620	675	725	765	800	830	1,075	1,180	1,360	1,670
	(41)	(2.6)	(2.8)	(3.0)	(3.2)	(3.4)	(3.6)	(3.7)	(4.8)	(5.2)	(6.0)	(7.4)
	2-1/2	1,525	1,670	1,930	2,160	2,365	2,555	2,730	2,235	2,450	2,825	3,460
	(64)	(6.8)	(7.4)	(8.6)	(9.6)	(10.5)	(11.4)	(12.1)	(9.9)	(10.9)	(12.6)	(15.4)
3/8	2-1/8	1,490	1,635	1,885	2,110	2,310	2,495	2,665	1,605	1,760	2,030	2,485
	(54)	(6.6)	(7.3)	(8.4)	(9.4)	(10.3)	(11.1)	(11.9)	(7.1)	(7.8)	(9.0)	(11.1)

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

Nominal anchor diameter in.	Nominal embed. depth in. (mm)	Tension - ϕN_n							Shear - ϕV_n			
		f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 5,000 psi (34.5 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)	f'_c = 7,000 psi (48.3 MPa) lb (kN)	f'_c = 8,000 psi (55.2 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)
1/4	1-5/8	300	315	345	370	390	410	425	765	835	965	1,180
	(41)	(1.3)	(1.4)	(1.5)	(1.6)	(1.7)	(1.8)	(1.9)	(3.4)	(3.7)	(4.3)	(5.2)
	2-1/2	760	830	960	1,070	1,175	1,270	1,355	1,585	1,735	2,000	2,450
	(64)	(3.4)	(3.7)	(4.3)	(4.8)	(5.2)	(5.6)	(6.0)	(7.1)	(7.7)	(8.9)	(10.9)
3/8	2-1/8	1,055	1,155	1,335	1,495	1,635	1,765	1,890	1,135	1,245	1,440	1,760
	(54)	(4.7)	(5.1)	(5.9)	(6.7)	(7.3)	(7.9)	(8.4)	(5.0)	(5.5)	(6.4)	(7.8)

3.3.8

1 See section 3.1.8 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 5 and 6 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. 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
1/4-in diameter by 2-1/2-in nominal embedment depth - $\alpha_{N,seis}$ = 0.75
3/8-in diameter by 2-1/8-in nominal embedment depth - $\alpha_{N,seis}$ = 0.75
No reduction needed for seismic shear. See Section 3.1.8 for additional information on seismic applications.

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

Nominal anchor diameter in.	Nominal internal thread diameter in.	Tensile[3] ϕN_{sa} lb (kN)	Shear[4] ϕV_{sa} lb (kN)	Seismic shear[5] ϕV_{sa} lb (kN)
1/4	1/4-20 UNC	3,680 (16.4)	815 (3.6)	365 (1.6)
	3/8-16 UNC	3,680 (16.4)	790 (3.5)	670 (3.0)
3/8	1/2-13 UNC	5,990 (26.6)	1,130 (5.0)	1,130 (5.0)

1 See section 3.1.8 to convert design strength value to ASD value.

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

3 Tension $\phi N_{sa} = \phi A_{se,N} f_{uta}$ as noted in ACI 318 Chapter 17.

4 Shear determined by static tests with $\phi V_{sa} < \phi\ 0.60\ A_{se,V} f_{uta}$ as noted in ACI 318 Chapter 17.

5 Seismic shear values determined by seismic shear tests with $\phi V_{sa} \leq \phi\ 0.60\ A_{se,V} f_{uta}$ as noted in ACI 318 Chapter 17. See Section 3.1.8 for additional information on seismic applications.

Table 5 — Load adjustment factors for 1/4-in. diameter Hilti KWIK HUS-EZ I and KWIK HUS-EZ E 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 6 — Load adjustment factors for 1/4-in. diameter Hilti KWIK HUS-EZ I and KWIK HUS-EZ E 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 Engineering software or perform anchor calculation using design equations from ACI 318 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 section 3.3.6 to calculate permissable edge distance, spacing and concrete thickness combinations.

Table 7 — Load Adjustment Factors for 3/8-in. diameter KWIK HUS-EZ I and KWIK HUS-EZ E 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	2-1/8	2-1/2	3-1/4	1-5/8	2-1/8	2-1/2	3-1/4	1-5/8	2-1/8	2-1/2	3-1/4	1-5/8	2-1/8	2-1/2	3-1/4	1-5/8	2-1/8	2-1/2	3-1/4	1-5/8	2-1/8	2-1/2	3-1/4
	(mm)	(41)	(54)	(64)	(83)	(41)	(54)	(64)	(83)	(41)	(54)	(64)	(83)	(41)	(54)	(64)	(83)	(41)	(54)	(64)	(83)	(41)	(54)	(64)	(83)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)																									
1-1/2	(38)	n/a	n/a	n/a	n/a	0.58	0.62	0.63	0.57	n/a	n/a	n/a	n/a	0.49	0.32	0.25	0.08	0.58	0.62	0.50	0.17	n/a	n/a	n/a	n/a
2	(51)	n/a	n/a	n/a	n/a	0.76	0.75	0.75	0.66	n/a	n/a	n/a	n/a	0.75	0.49	0.38	0.13	0.76	0.75	0.75	0.26	n/a	n/a	n/a	n/a
2-1/4	(57)	0.84	0.74	0.70	0.65	0.86	0.82	0.81	0.70	0.65	0.62	0.60	0.55	0.90	0.59	0.46	0.16	0.90	0.82	0.81	0.31	n/a	n/a	n/a	n/a
2-1/2	(64)	0.88	0.77	0.72	0.67	0.95	0.91	0.88	0.75	0.67	0.63	0.61	0.55	1.00	0.69	0.54	0.18	1.00	0.91	0.88	0.37	n/a	n/a	n/a	n/a
3	(76)	0.95	0.82	0.77	0.70	1.00	1.00	1.00	0.85	0.71	0.66	0.63	0.56		0.90	0.71	0.24		1.00	1.00	0.48	n/a	n/a	n/a	n/a
3-1/4	(83)	0.99	0.85	0.79	0.72				0.90	0.72	0.67	0.64	0.57		1.00	0.80	0.27				0.54	0.95	n/a	n/a	n/a
3-1/2	(89)	1.00	0.88	0.81	0.73				0.95	0.74	0.68	0.65	0.58			0.89	0.30				0.61	0.98	n/a	n/a	n/a
4	(102)		0.93	0.86	0.77				1.00	0.78	0.71	0.68	0.59			1.00	0.37				0.74	1.00	0.91	0.84	n/a
4-1/2	(114)		0.99	0.90	0.80					0.81	0.73	0.70	0.60				0.44				0.88			0.89	n/a
4-3/4	(121)		1.00	0.93	0.82					0.83	0.75	0.71	0.60				0.48				0.96			0.91	0.639
5	(127)			0.95	0.83					0.84	0.76	0.72	0.61				0.52				1.00			0.94	0.655
6	(152)			1.00	0.90					0.91	0.81	0.76	0.63				0.68							1.00	0.718
7	(178)				0.97					0.98	0.86	0.81	0.65				0.86								0.775
8	(203)				1.00					1.00	0.91	0.85	0.67				1.00								0.829
9	(229)										0.97	0.90	0.69												0.879
10	(254)										1.00	0.94	0.71												0.927
11	(279)											0.98	0.74												0.972
12	(305)											1.00	0.76												1.000
14	(356)												0.80												
16	(406)												0.84												
18	(457)												0.89												
20	(508)												0.93												
24	(610)												1.000												

Table 8 — Load Adjustment Factors for 3/8-in. diameter Hilti KWIK HUS-EZ I and KWIZ HUS-EZ E in cracked concrete [1,2]

3.3.6

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	2-1/8	2-1/2	3-1/4	1-5/8	2-1/8	2-1/2	3-1/4	1-5/8	2-1/8	2-1/2	3-1/4	1-5/8	2-1/8	2-1/2	3-1/4	1-5/8	2-1/8	2-1/2	3-1/4	1-5/8	2-1/8	2-1/2	3-1/4
	(mm)	(41)	(54)	(64)	(83)	(41)	(54)	(64)	(83)	(41)	(54)	(64)	(83)	(41)	(54)	(64)	(83)	(41)	(54)	(64)	(83)	(41)	(54)	(64)	(83)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)																									
1-1/2	(38)	n/a	n/a	n/a	n/a	0.92	0.74	0.66	0.57	n/a	n/a	n/a	n/a	0.49	0.32	0.25	0.09	0.92	0.64	0.50	0.17	n/a	n/a	n/a	n/a
2	(51)	n/a	n/a	n/a	n/a	1.00	0.90	0.79	0.66	n/a	n/a	n/a	n/a	0.76	0.50	0.39	0.13	1.00	0.90	0.77	0.26	n/a	n/a	n/a	n/a
2-1/4	(57)	0.84	0.74	0.70	0.65	1.00	0.98	0.85	0.70	0.66	0.62	0.60	0.55	0.90	0.59	0.46	0.16	1.00	0.98	0.85	0.31	n/a	n/a	n/a	n/a
2-1/2	(64)	0.88	0.77	0.72	0.67	1.00	1.00	0.92	0.75	0.67	0.63	0.61	0.55	1.00	0.69	0.54	0.18	1.00	1.00	0.92	0.37	n/a	n/a	n/a	n/a
3	(76)	0.95	0.82	0.77	0.70	1.00		1.00	0.85	0.71	0.66	0.63	0.56	1.00	0.91	0.71	0.24	1.00	1.00	1.00	0.48	n/a	n/a	n/a	n/a
3-1/4	(83)	0.99	0.85	0.79	0.72				0.90	0.73	0.67	0.64	0.57		1.00	0.80	0.27				0.55	0.95	n/a	n/a	n/a
3-1/2	(89)	1.00	0.88	0.81	0.73				0.95	0.74	0.68	0.65	0.58			0.90	0.31				0.61	0.98	n/a	n/a	n/a
4	(102)		0.93	0.86	0.77				1.00	0.78	0.71	0.68	0.59			1.00	0.37				0.75	1.00	0.91	0.84	n/a
4-1/2	(114)		0.99	0.90	0.80					0.81	0.73	0.70	0.60				0.44				0.89		0.97	0.89	n/a
4-3/4	(121)		1.00	0.93	0.82					0.83	0.75	0.71	0.60				0.48				0.97		1.00	0.92	0.64
5	(127)			0.95	0.83					0.85	0.76	0.72	0.61				0.52				1.00			0.94	0.66
6	(152)			1.00	0.90					0.92	0.81	0.77	0.63				0.69							1.00	0.72
7	(178)				0.97					0.98	0.87	0.81	0.65				0.86								0.78
8	(203)				1.00					1.00	0.92	0.85	0.67				1.00								0.83
9	(229)										0.97	0.90	0.69												0.88
10	(254)										1.00	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 Engineering software or perform anchor calculation using design equations from ACI 318 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.

Table 9 — Hilti KWIK HUS-EZ I and KWIK HUS-EZ E in the soffit of uncracked lightweight concrete over metal deck[1,2,3,4,5,6]

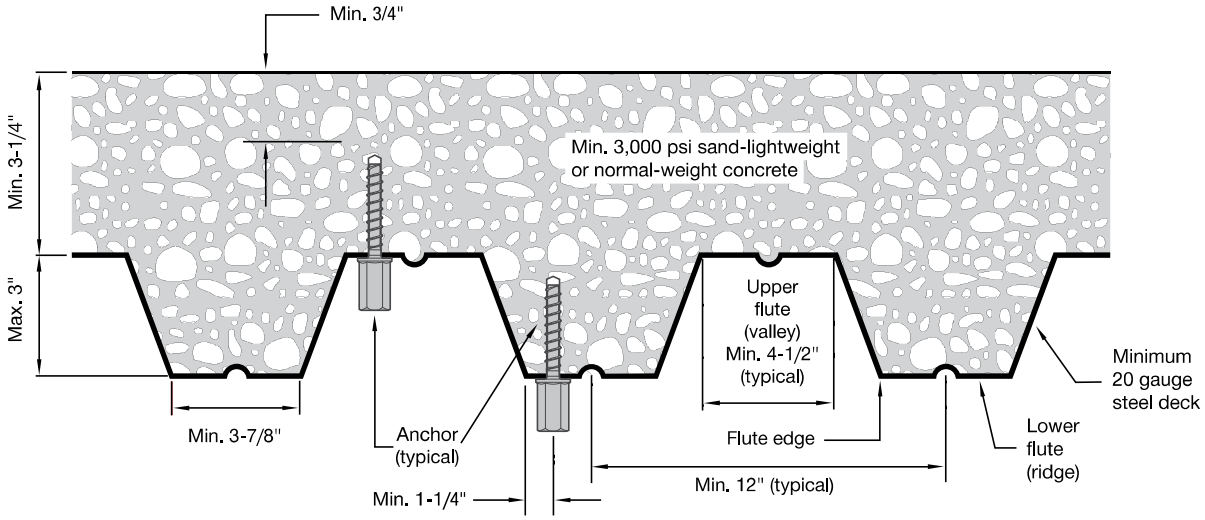
Nominal anchor diameter in.	Nominal internal thread diameter in.	Nominal embed. depth in. (mm)	Installation in lower flute				Installation in upper flute			
			Tension - ϕN_n		Shear - ϕV_n		Tension - ϕN_n		Shear - ϕV_n	
			f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	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	1/4-20 UNC	1-5/8 (41)	545 (2.4)	595 (2.6)	515 (2.3)	515 (2.3)	670 (3.0)	730 (3.2)	610 (2.7)	610 (2.7)
		2-1/2 (64)	1,220 (5.4)	1,410 (6.3)	515 (2.3)	515 (2.3)	1,275 (5.7)	1,470 (6.5)	610 (2.7)	610 (2.7)
	3/8-16 UNC	1-5/8 (41)	545 (2.4)	595 (2.6)	615 (2.7)	615 (2.7)	670 (3.0)	730 (3.2)	915 (4.1)	915 (4.1)
		2-1/2 (64)	1,220 (5.4)	1,410 (6.3)	615 (2.7)	615 (2.7)	1,275 (5.7)	1,470 (6.5)	915 (4.1)	915 (4.1)
3/8	1/2-13 UNC	2-1/8 (54)	1,120 (5.0)	1,295 (5.8)	1,430 (6.4)	1,430 (6.4)	1,730 (7.7)	2,000 (8.9)	2,190 (9.7)	2,190 (9.7)

Table 10 — Hilti KWIK HUS-EZ I and KWIK HUS-EZ E in the soffit of cracked lightweight concrete over metal deck[1,2,3,4,5,6,7,8]

Nominal anchor diameter in.	Nominal internal thread diameter in.	Nominal embed. depth 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 (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)	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	1/4-20 UNC	1-5/8 (41)	280 (1.2)	305 (1.4)	515 (2.3)	515 (2.3)	330 (1.5)	360 (1.6)	610 (2.7)	610 (2.7)
		2-1/2 (64)	605 (2.7)	700 (3.1)	515 (2.3)	515 (2.3)	635 (2.8)	735 (3.3)	610 (2.7)	610 (2.7)
	3/8-16 UNC	1-5/8 (41)	280 (1.2)	325 (1.4)	615 (2.7)	615 (2.7)	330 (1.5)	380 (1.7)	915 (4.1)	915 (4.1)
		2-1/2 (64)	605 (2.7)	700 (3.1)	615 (2.7)	615 (2.7)	635 (2.8)	735 (3.3)	915 (4.1)	915 (4.1)
3/8	1/2-13 UNC	2-1/8 (54)	795 (3.5)	920 (4.1)	1,430 (6.4)	1,430 (6.4)	1,225 (5.4)	1,415 (6.3)	2,190 (9.7)	2,190 (9.7)

1 See Section 3.1.8 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. For seismic tenison loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis}$ = 0.75.
8 For seismic shear, an additional factor must be applied to the cracked concrete tabular values for seismic conditions:
1/4-in diameter by 1-5/8-in nominal embedment depth - $\alpha_{V,seis}$ = 0.44
1/4-in diameter by 2-1/2-in nominal embedment depth - $\alpha_{V,seis}$ = 0.85
See Section 3.1.8 for additional information on seismic applications.

Figure 2 — Installation of Hilti KWIK HUS-EZ I and KWIK HUS-EZ E in soffit of concrete over steel deck floor and roof assemblies



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.

DESIGN INFORMATION IN CONCRETE PER CSA A23.3

Limit State Design of anchors is described in the provisions of CSA A23.3 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 resistance 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 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 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 11 — Steel resistance for Hilti KWIK HUS-EZ I and KWIK HUS-EZ E carbon steel screw anchor[1,2]

Nominal anchor diameter in.	Internal thread diameter (UNC)	Tensile[3] N_{sar} lb (kN)	Shear[4] V_{sar} lb (kN)	Seismic shear[5] $V_{sar,eq}$ lb (kN)
1/4	1/4-20	3,370 (15.0)	750 (3.3)	335 (1.5)
1/4	3/8-16	3,370 (15.0)	725 (3.2)	620 (2.8)
3/8	1/2-13	5,515 (24.5)	1,040 (4.6)	1,040 (4.6)

1 See Section 3.1.8 of Hilti Product Technical Guide Ed 21 to convert factored resistance value to ASD value.

2 Hilti KWIK HUS-EZ I 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 Annex D.

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

5 Seismic shear values determined by seismic shear tests with $V_{sar,eq} \leq 0.60\ A_{se,V}\ \phi_s\ f_{uta}$ R as noted in CSA A23.3 Annex D. See Section 3.1.8 of Hilti Product Technical Guide Ed 21 for additional information on seismic applications.

Table 12 — Hilti KWIK HUS-EZ I and KWIK HUS-EZ E design information in accordance with CSA A23.3 Annex D[1]

Design parameter		Symbol	Units	Nominal anchor diameter			Ref
				1/4		3/8	A23.3
Anchor O.D.		d_a	in. (mm)	0.25 (6.4)		0.375 (9.5)	
Effective embedment[2]		h_{ef}	in. (mm)	1.18 (30)	1.92 (49)	1.54 (39)	
Minimum nominal embedment[2]		h_{nom}	in. (mm)	1-5/8 (41)	2-1/2 (64)	2 1/8 (54)	
Minimum concrete thickness		h_{min}	in. (mm)	3-1/4 (83)	4-1/8 (105)	3 5/8 (92)	
Critical edge distance		c_{ac}	in. (mm)	2.00 (51)	2.78 (71)	2.75 (70)	
Minimum spacing at critical edge distance		$s_{min,cac}$	in. (mm)	1.5 (38)		2.25 (57)	
Minimum edge distance		c_{min}	in. (mm)	1.50 (38)		1.5 (38)	
Minimum anchor spacing at minimum edge distance		for s >	in. (mm)	3.0 (76)		3 (76)	
Mininimum hole depth in concrete		h_0	in. (mm)	2 (51)	2-7/8 (73)	2 3/8 (60)	
Minimum specified ultimate strength		f_{uta}	psi (N/mm²)	125,000 (862)		106,975 (826)	
Effective tensile stress area		$A_{se,N}$	in² (mm²)	0.045 (29.0)		0.086 (55.5)	
Steel embed. material resistance factor for reinforcement		ϕ_s	-	0.85			8.4.3
Resistance modification factor for tension, steel failure modes[3]		R	-	0.70			D.5.3
Resistance modification factor for shear, steel failure modes[3]		R	-	0.65			D.5.3
Factored steel resistance in tension		N_{sar}	lb (kN)	3,370 (15.0)		5,475 (24.4)	D.6.1.2
Factored steel resistance in shear	1/4-20 UNC internal thread	V_{sar}	lb (kN)	750 (3.3)		N/A	D.7.1.2
Factored steel resistance in shear, seismic	1/4-20 UNC internal thread	$V_{sar,eq}$	lb (kN)	335 (1.5)		N/A	
Factored steel resistance in shear	3/8-16 UNC internal thread	V_{sar}	lb (kN)	725 (3.2)		N/A	D.7.1.2
Factored steel resistance in shear, seismic	3/8-16 UNC internal thread	$V_{sar,eq}$	lb (kN)	620 (2.8)		N/A	
Factored steel resistance in shear	1/2-13 UNC internal thread	V_{sar}	lb (kN)	N/A		1040 (4.6)	
Factored steel resistance in shear, seismic	1/2-13 UNC internal thread	$V_{sar,eq}$	lb (kN)	N/A		1040 (4.6)	
Coeff. for factored conc. breakout resistance, uncracked concrete		$k_{c,uncr}$	-	10			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 conc.[4]		$\psi_{c,N}$	-	1.0			D.6.2.6
Anchor category		-	-	3	1	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[5]		R	-	0.75	1.00	1.00	D.5.3 (c)
Factored pullout resistance in 20 MPa uncracked concrete[6]		$N_{pr,uncr}$	lb (kN)	665 (3.0)	1,645 (7.3)	N/A	D.6.3.2
Factored pullout resistance in 20 MPa cracked concrete[6]		$N_{pr,cr}$	lb (kN)	340 (1.5)	815 (3.6)	N/A	D.6.3.2
Factored seismic pullout resistance in 20 MPa cracked concrete[6]		$N_{pr,eq}$	lb (kN)	275 (1.2)	815 (3.6)	N/A	D.6.3.2

1 Design information in this table is taken from ICC-ES ESR-3027, tables 6, 7, and 8, and converted for use with CSA A23.3 Annex D.
2 See figure 1 of this section.
3 The KWIK HUS-EZ I is considered a brittle steel element as defined by CSA A23.3 Annex D section D.2.
4 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.
5 For use with the load combinations of CSA A23.3 chapter 8. Condition B applies where supplementary reinforcement in conformance with CSA A23.3 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.
6 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.

Table 13 — Hilti KWIK HUS-EZ I and KWIK HUS-EZ E 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)	Effec-tiveness Factor	Strength Reduction Factor Tension	Concrete material resistance factor	Pullout Strength (2500 psi concrete)	Tension - N_r				Shear - V_r			
							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)	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)	10	0.75	0.65	1305 (5.8)	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)	10	1	0.65	2350 (10.5)	1,645 (7.3)	1,840 (8.2)	2,015 (9.0)	2,325 (10.3)	2,225 (9.9)	2,490 (11.1)	2,725 (12.1)	3,145 (14.0)
3/8	1.54 (39)	2-1/8 (54)	10	1	0.65	N/A	1,595 (7.1)	1,785 (7.9)	1,955 (8.7)	2,260 (10.0)	1,595 (7.1)	1,785 (7.9)	1,955 (8.7)	2,260 (10.0)

Table 14 — Hilti KWIK HUS-EZ I and KWIK HUS-EZ E 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)	Effec-tiveness Factor	Strength Reduction Factor Tension	Concrete material resistance factor	Pullout Strength (2500 psi concrete)	Tension - N_r				Shear - V_r			
							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)	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)
d_a in (mm)	h_{ef} (mm)	h_{nom} (mm)	k_{cr}	R	Φ_c	$N_{p,uncr}$ (N/mm^2)	20	25	30	40	20	25	30	40
1/4	1.18 (30)	1-5/8 (41)	7	0.75	0.65	665 (3.0)	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)	7	1	0.65	1165 (5.2)	815 (3.6)	910 (4.1)	1,000 (4.4)	1,155 (5.1)	1,800 (8.0)	1,740 (7.7)	1,910 (8.5)	2,205 (9.8)
3/8	1.54 (39)	2-1/8 (54)	7	1	0.65	N/A	1,120 (5.0)	1,250 (5.6)	1,370 (6.1)	1,580 (7.0)	1,120 (5.0)	1,250 (5.6)	1,370 (6.1)	1,580 (7.0)

1 See section 3.1.8 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 5 to 6 as necessary. Compare to the steel values in table 9. 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 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

1/4-in diameter by 2-1/2-in nominal embedment depth - $\alpha_{N,seis}$ = 0.75.

No reduction needed for seismic shear. See section 3.1.8 for additional information on seismic applications.

Table 15 — Hilti KWIK HUS-EZ I and KWIK HUS-EZ E in the soffit of uncracked lightweight concrete over metal deck[1,2,3,4,5,6,7]

Nominal anchor diameter in.	Nominal internal thread diameter in.	Nominal embed. depth 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 (2,900 psi) kN	f'_c = 30 MPa (4,350 psi) kN	f'_c = 20 MPa (2,900 psi) kN	f'_c = 30 MPa (4,350 psi) kN	f'_c = 20 MPa (2,900 psi) kN	f'_c = 30 MPa (4,350 psi) kN	f'_c = 20 MPa (2,900 psi) kN	f'_c = 30 MPa (4,350 psi) kN
1/4	1/4-20 UNC	1-5/8 (41)	585 (2.6)	660 (2.9)	475 (2.1)	475 (2.1)	720 (3.2)	810 (3.6)	560 (2.5)	560 (2.5)
		2-1/2 (64)	1,200 (5.3)	1,470 (6.5)			1,255 (5.6)	1,535 (6.8)		
1/4	3/8-16 UNC	1-5/8 (41)	585 (2.6)	660 (2.9)	565 (2.5)	565 (2.5)	720 (3.2)	810 (3.6)	845 (3.8)	845 (3.8)
		2-1/2 (64)	1,200 (5.3)	1,470 (6.5)			1,255 (5.6)	1,535 (6.8)		
3/8	1/2-13 UNC	2-1/8 (54)	1,100 (4.9)	1,345 (6.0)	1,315 (5.8)	1,315 (5.8)	1,865 (8.3)	2,280 (10.1)	2,015 (9.0)	2,015 (9.0)

Table 16 — Hilti KWIK HUS-EZ I and KWIK HUS-EZ E in the soffit of cracked lightweight concrete over metal deck[1,2,3,4,5,6,7,8]

Nominal anchor diameter in.	Nominal internal thread diameter in.	Nominal embed. depth 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 (2,900 psi) kN	f'_c = 30 MPa (4,350 psi) kN	f'_c = 20 MPa (2,900 psi) kN	f'_c = 30 MPa (4,350 psi) kN	f'_c = 20 MPa (2,900 psi) kN	f'_c = 30 MPa (4,350 psi) kN	f'_c = 20 MPa (2,900 psi) kN	f'_c = 30 MPa (4,350 psi) kN
1/4	1/4-20 UNC	1-5/8 (41)	300 (1.3)	340 (1.5)	475 (2.1)	475 (2.1)	365 (1.6)	415 (1.8)	560 (2.5)	560 (2.5)
		2-1/2 (64)	595 (2.6)	730 (3.2)			625 (2.8)	765 (3.4)		
1/4	3/8-16 UNC	1-5/8 (41)	300 (1.3)	340 (1.5)	565 (2.5)	565 (2.5)	365 (1.6)	415 (1.8)	845 (3.8)	845 (3.8)
		2-1/2 (64)	595 (2.6)	730 (3.2)			625 (2.8)	765 (3.4)		
3/8	1/2-13 UNC	2-1/8 (54)	780 (3.5)	955 (4.2)	1,315 (5.8)	1,315 (5.8)	1,305 (5.8)	1,595 (7.1)	2,015 (9.0)	2,015 (9.0)

1 See Section 3.1.8 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 6 3/8 inches.
4 Tabular value is for 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. For seismic conditions $\alpha_{N,seis}$ = 0.75
8 For seismic shear, an additional factor must be applied to the cracked concrete tabular values for seismic conditions: $\alpha_{v,seis}$ = 0.85
See Section 3.1.8 for additional information on seismic applications.

ALLOWABLE STRESS DESIGN FOR FM SPRINKLER SYSTEMS

Table 17 — Hilti KWIK HUS-EZ I and KWIK HUS-EZ E tested load values for FM approval for automatic sprinkler systems[1]

Anchor diamenter in.	Hanger rod size	Nominal embedment in.	FM tension test load lb.	FM maximum pipe diameter in.
1/4	3/8-16 UNC	1-5/8	1,475	4
		2-1/2		
3/8	1/2-13 UNC	2-1/8	3,800	8

1 Tested in accordance with FM Approval Standard for Pipe Hanger Components for Automatic Sprinklers Systems Class Numbers 1951, 1952 and 1953.

DESIGN INFORMATION IN HOLLOW CORE CONCRETE PER ALLOWABLE STRESS DESIGN

Table 18 — Hilti KWIK HUS-EZ I and KWIK HUS-EZ E load values for installations into hollow core concrete panels[1,2]

Hanger rod size	anchor diameter in.	Min. effective embedment h_{ef} in.	Min.effective base material thickness t in.	Allowable load[3]		Ultimate load	
				Tension lb	Shear lb[4,5]	Tension lb	Shear lb[4,5]
1/4-20 UNC	1/4	1-3/8	1-3/8	455	485	1,810	1,930
3/8-16 UNC	1/4				755		3,025
1/2-13 UNC	3/8	1-1/8	1-1/8	435	N/A	1,750	N/A

1 The admissible anchor location must be established to prevent damage to the prestressed cable during the drilling process. Verify the location and height of the cable with the hollow core plank supplier to confirm admissible anchor location.

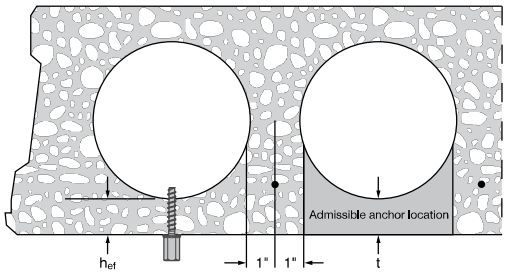
2 Minimum compressive strength of prestressed concrete is 7,000 psi. Published ultimate loads represent the average results conducted in local base materials. Due to variations in materials and dimensionl configurations, on-site testing is required to determine the actual performance.

3 Allowable loads calculated with a factor of safety of 4

4 The bottom of the shear plane adjacent to the top of the coupler.

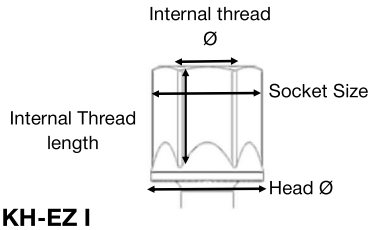
5 Shear values controlled by the steel strength of the screws used to fasten the shear fixture to the KH EZ-I Screw Anchor. The minimum tensile strength of the screw was 125 ksi. Shear design values should consider the screw or threaded rod steel strength.

Figure 3 — Installation of Hilti KWIK HUS–EZ I and KH-EZ E in hollow core concrete



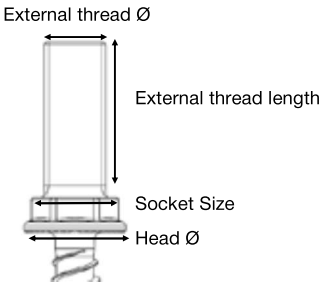
INSTALLATION INSTRUCTIONS

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.



KH-EZ I

KH-EZ Ø	Socket Size	Head Ø	Internal thread Ø	Internal thread length
1/4''	3/8''	0.59''	1/4''	0.37''
1/4''	1/2''	0.65''	3/8''	0.45''
3/8''	11/16''	0.81''	1/2''	0.46''



KH-EZ E

KH-EZ Ø	Socket Size	Min Socket Height	Head Ø	Internal thread Ø	Internal thread length	Total Head height
1/4''	1/2''	1-1/2''	0.65''	3/8''	1.08''	1.32''

ORDERING INFORMATION[1]

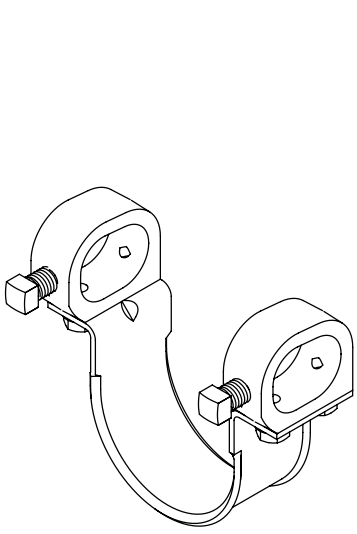
Description	Internal thread diameter	Internal thread length	Drill bit diameter	Minimum embedment	Qty / box
KWIK HUS-EZ 1/4x1-5/8 | 1/4	1/4	3/8	1/4	1-5/8	100
KWIK HUS-EZ 1/4x2-1/2 | 1/4	1/4	3/8	1/4	2-1/2	100
KWIK HUS-EZ 1/4x1-5/8 | 3/8	3/8	7/16	1/4	1-5/8	100
KWIK HUS-EZ 1/4x2-1/2 | 3/8	3/8	7/16	1/4	2-1/2	100
KWIK HUS-EZ 3/8x2-1/8 | 1/2	1/2	1/2	3/8	2-1/8	100
KWIK HUS-EZ 1/4x1-5/8 E 3/8	3/8	1	1/4	1-5/8	100

1 All dimensions in inches.

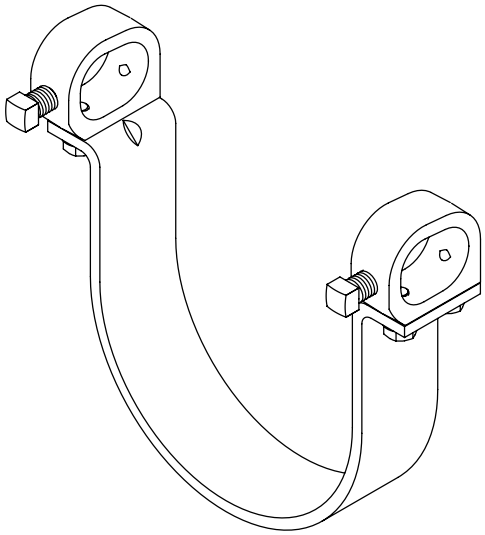
ASC Engineered Solutions

Model K Lateral Sway Brace
Fig. AF035

c UL us LISTED FM APPROVED



1" (DN25) to 3" (DN80) Service Pipe



4" (DN100) to 12" Service Pipe

Material Specifications

Size Range:
Service Pipe Size: 1" – 12"
Brace Member: 1" – 2"

Material
Ductile Iron Casting with Carbon Steel Strap and Hardware

Finish
☐ Plain
☐ Electro-Galvanized

Service
A seismic lateral brace designed to connect a brace member to the service pipe. The AF035 rigidly braces steel and CPVC piping systems subjected to horizontal and vertical seismic loads.

Approvals
cULus Listed (ANSI/UL 203a) and FM Approved (FM 1950-13). Complies with NFPA 13, ASCE 7, IBC, & MSS SP-127 bracing requirements.

Features
- The set screw provides a visual indication that proper installation has been achieved
- Rounded edge design eliminates potential for abrasion of CPVC pipe

Patents
No. 7,516,922, No. 7,523,895

Ordering
Specify figure number, service pipe size, brace size, finish, and description.

AFCON
An ASC Engineered Solution

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

Model K Lateral Sway Brace
Fig. AF035

FIG. AF035: Weight Per Size

Service Pipe Size	Brace Member Size			
	1" (DN25)	1¼"(DN32)	1½" (DN40)	2" (DN50)
1 (DN25)	1.60 lbs	1.80 lbs	2.00 lbs	2.28 lbs
1¼" (DN32)	1.68 lbs	1.88 lbs	2.08 lbs	2.36 lbs
1½" (DN40)	1.64 lbs	1.84 lbs	2.04 lbs	2.32 lbs
2" (DN50)	1.88 lbs	2.08 lbs	2.28 lbs	2.56 lbs
2½"	1.90 lbs	2.10 lbs	2.30 lbs	2.58 lbs
DN65	2.00 lbs	2.20 lbs	2.40 lbs	2.68 lbs
3" (DN80)	2.10 lbs	2.30 lbs	2.50 lbs	2.78 lbs
4" (DN100)	2.18 lbs	3.38 lbs	3.58 lbs	3.76 lbs
5" (DN125)	3.40 lbs	3.60 lbs	3.80 lbs	4.08 lbs
DN150	3.80 lbs	4.00 lbs	4.20 lbs	4.48 lbs
6"	3.90 lbs	4.10 lbs	4.30 lbs	4.58 lbs
DN200	4.70 lbs	4.90 lbs	5.10 lbs	5.38 lbs
8"	4.80 lbs	5.00 lbs	5.20 lbs	5.48 lbs
10"	5.60 lbs	5.80 lbs	6.00 lbs	6.28 lbs
12"	6.16 lbs	6.36 lbs	6.56 lbs	6.84 lbs

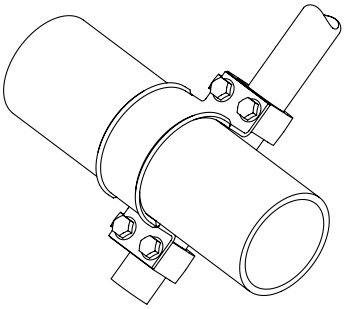
ASC Engineered Solutions

Model K Lateral Sway Brace
Fig. AF035

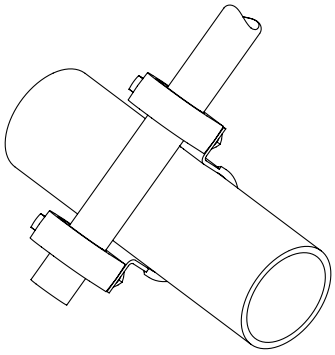
FIG. AF035 cULus Listing per ANSI/UL 203a (ASD)

Service Pipe Size	Standard Service Pipe	Speicalty Service Pipe	Horizontal Load Rating at Brace Angle			
			30°-44°	45°-59°	60°-90°	Listed
			lbf/kN	lbf/kN	lbf/kN	lbf/kN
1" (DN25)	Sch. 10 Sch. 40 CPVC Metric Pipe	Mega-Thread MLT / GL Eddy Thread EZ-Thread				
1¼" (DN32)	Sch. 10 Sch. 40 CPVC Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread				
1½" (DN40)	Sch. 10 Sch. 40 CPVC Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread Fire-Flo	625 2.78	884 3.93	1082 4.81	1250 5.56
2" (DN50)	Sch. 10 Sch. 40 CPVC Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread Fire-Flo				
2½"	Sch. 10 Sch. 40 CPVC	Mega-Flow Eddy Flow Fire-Flo				
DN65	Metric Pipe	–				
3" (DN80)	Sch. 10 Sch. 40 CPVC Metric Pipe	Mega-Flow Eddy Flow Fire-Flo				
4" (DN100)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo				
5" (DN125)	Sch. 10 Sch. 40 Metric Pipe	–				
DN150	Metric Pipe	–	942 4.19	1333 5.93	1632 7.26	1885 8.38
6"	Sch. 10 Sch. 40	Mega-Flow				
DN200	Metric Pipe	–				
8"	0.188" wall Sch. 40	–				
10"	0.188" wall Sch. 40	–				
12"	0.188" wall Sch. 40	–	1125 5.00	1591 7.08	1948 8.67	2250 10.01

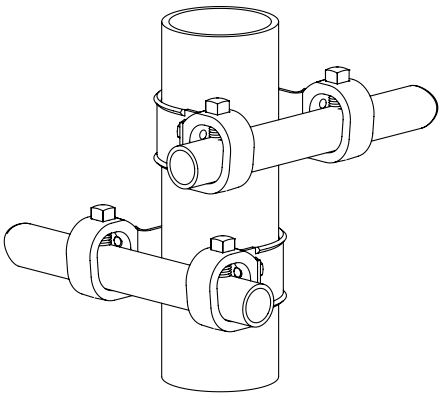
1) Brace Angles are determined from Vertical.
2) Sch. 10 & 0.188" Wall Load Ratings may be used for any thicker wall pipe of the same diameter.
3) Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.
4) See table below for UL listed specialty pipes & UL Listed metric service pipes.
5) Load Ratings reflect 1" (DN25) – 2" (DN50) brace members. See table below for listed brace members.
6) Minimum safety factor of 2.2 in accordance with NFPA 13-2019 Section A.18.5.2.3.



Lateral Application



Lateral Application



Riser Application

asc-es.com

Building connections that last™

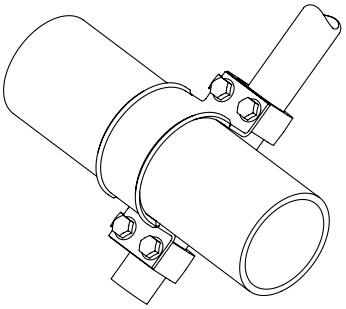
Model K Lateral Sway Brace
Fig. AF035

FIG. AF035 cULus Listing Per UL 203a (ASD) For NFPA 13-2016 Editions Or Earlier

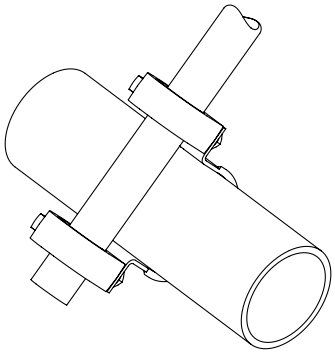
UL's current Listings are predicated on installation in accordance with the latest edition of NFPA 13. The 2016 and earlier editions of NFPA 13 referenced a minimum safety factor of 1.5 for the load rating as compared to 2.2 for the current edition. The load ratings noted in this table are consistent with the historical cULus Listings that were evaluated to the requirements of UL 203A, Outline of Investigation for Sway Brace Devices for Fire Sprinkler System Piping, based upon a minimum safety factor of 1.5 in accordance with the earlier editions of NFPA 13. The load ratings based upon the 2016 or earlier editions of NFPA 13 should only be used where approved by the Authority Having Jurisdiction (AHJ).

Service Pipe Size	Standard Service Pipe	Speicalty Service Pipe	Horizontal Load Rating at Brace Angle			
			30°-44°	45°-59°	60°-74°	75°-90°
			lbf/kN	lbf/kN	lbf/kN	lbf/kN
1" (DN25)	Sch. 10 Sch. 40 Metric Pipe	Mega-Thread MLT / GL Eddy Thread EZ-Thread				
1¼" (DN32)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread				
1½" (DN40)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread Fire-Flo				
2" (DN50)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread Fire-Flo				
2½"	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo	1382 6.15	1955 8.70	2393 10.65	2765 15.52
DN65	Metric Pipe	–				
3" (DN80)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo				
4" (DN100)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo				
5" (DN125)	Sch. 10 Sch. 40 Metric Pipe	–				
DN150	Metric Pipe	–				
6"	Sch. 10 Sch. 40	Mega-Flow				
DN200	Metric Pipe	–				
8"	0.188" Wall Sch. 40	–				
10"	0.188" Wall Sch. 40	–				
12"	0.188" Wall Sch. 40	–	1870 8.32	2644 11.77	3238 14.40	3740 16.64

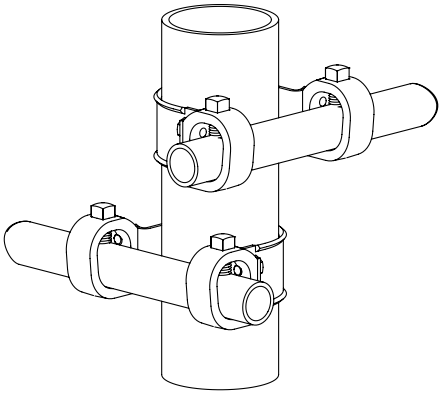
1) Brace Angles are determined from Vertical.
2) Sch. 10 & 0.188" Wall Load Ratings may be used for any thicker wall pipe of the same diameter.
3) Listed load ratings reduced for angle ranges in accordance with NFPA 13-2016 Section A.9.3.5.2.3.
4) See table below for UL listed specialty pipes & UL Listed metric service pipes.
5) Load Ratings reflect 1" (DN25) – 2" (DN50) brace members. See table below for listed brace members.
6) Minimum safety factor of 2.2 in accordance with NFPA 13-2016 Section A.9.3.5.2.3.



Lateral Application



Lateral Application



Riser Application

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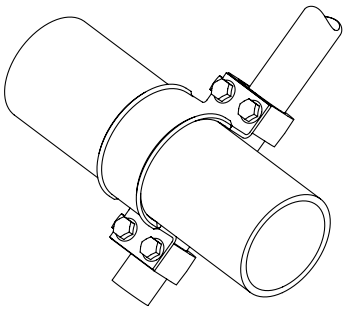
Model K Lateral Sway Brace
Fig. AF035

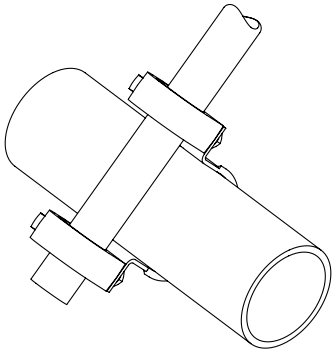
FIG. AF035 FM Approved (Listing) per FM 1950-13 (ASD)

Service Pipe Size	Standard Service Pipe	Speicalty Service Pipe	Horizontal Load Rating at Brace Angle			
			30°-44°	45°-59°	60°-74°	75°-90°
			lbf/kN	lbf/kN	lbf/kN	lbf/kN
1" (DN25)	Sch. 10 Sch. 40 Metric Pipe	Mega-Thread MLT / GL Eddy Thread EZ-Thread	1660 7.38	2350 10.45	2880 12.81	3210 14.28
1¼" (DN32)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread				
1½" (DN40)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread Fire-Flo	1540 6.85	2170 9.65	2660 11.83	2970 13.21
2" (DN50)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread Fire-Flo				
2½"	Sch. 10 Sch. 40	Mega-Flow Eddy Flow Fire-Flo	1270 5.65	1790 7.96	2200 9.79	2450 10.90
DN65	Metric Pipe	–				
3" (DN80)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo				
4" (DN100)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo	1020 4.54	1450 6.45	1770 7.87	1980 8.81
5" (DN125)	Sch. 10 Sch. 40 Metric Pipe	–	860 3.83	1220 5.43	1490 6.63	1660 7.38
DN150	Metric Pipe	–				
6"	Sch. 10 Sch. 40	Mega-Flow				
DN200	Metric Pipe	–	540 2.40	770 3.43	950 4.23	1060 4.72
8"	0.188" Wall Sch. 40	–				

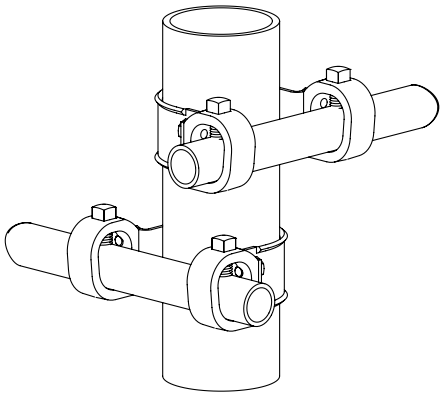
1) Brace Angles are determined from Vertical.
2) Sch. 10 & 0.188" Wall Load Ratings may be used for any thicker wall pipe of the same diameter.
3) See table below for FM listed specialty pipes & FM Listed metric service pipes.
4) Load Ratings reflect 1" (DN25) – 2" (DN50) brace members. See table below for listed brace members.
5) Minimum safety factor of 1.5 in accordance with NFPA 13-2016 Section A.9.3.5.2.3. To convert the load ratings above to a safety factor of 2.2 per NFPA 13-2019 Section A.18.5.2.3, multiply load ratings by a factor of 0.68.
5) To convert to LRFD Load Ratings, ASD Load Ratings may be multiplied by a factor of 1.5.



Lateral Application



Lateral Application



Riser Application

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Building connections that last™

Model K Lateral Sway Brace
Fig. AF035

1 Place the AF035 over the service pipe to be braced.

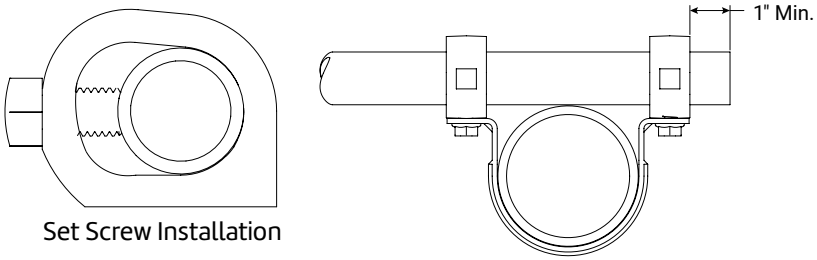
2 Insert the brace member through the cast hoop ends.
The end of the brace pipe shall extend at least 1" (25.4 mm) past the cast hoop ends.

3 Hand tighten the set screws until they contact the brace member.
Continue to torque the set screws until the heads bottom out on the cast hoop ends.

4 Tighten per the fastener or structural attachment specifications.

5 Ensure the brace angle is within the specified range.

Notes: The brace member may be installed above or below the service pipe.



Set Screw Installation

FIG. AF035 cULus Listed & FM Approved Brace Members

Brace Member	Brace Size	Standard (or Equivalent)	UL	FM
Sch. 40 NPS Pipe	1", 1¼", 1½", 2"	ASTM A53, A106, A135, or A795	✓	✓
Sch. 40 Metric Pipe	DN25 DN32 DN40 DN50	KS S 3562	✓	✓
		EN10255H		✓
Metric Pipe		GB/T 3091		✓
		JIS G3454		✓

FIG. AF035 cULus Listed & FM Approved Metric Service Pipes

Service Pipe Standard (or Equivalent)	Service Pipe Size	UL	FM
KS D 3507 KS D 3537	DN25 DN32 DN40 DN50 DN65 DN80 DN100 DN125 DN150 DN200	✓	✓
KS D 3562 Sch. 40		✓	✓
GB/T 3091 GB/T 3092			✓
JIS G3452			✓
EN 10255M			✓
EN 10255H			✓

Notes:
ASC Engineered Solutions™ brand bracing components are designed to be compatible ONLY with other ASC Engineered Solutions brand bracing components, resulting in a Listed seismic bracing assembly. Updated UL listing information may be viewed at www.ul.com and updated FM approval information may be viewed at www.approvalguide.com.

Disclaimer:
ASC Engineered Solutions does not provide any warranties and specifically disclaims any liability whatsoever with respect to ASC bracing products and components that are used in combination with products, parts or systems not manufactured or sold by ASC. In no event shall ASC be liable for any incidental, direct, consequential, special or indirect damages or lost profits where non-ASC bracing components have been, or are used.

Seis Brace® Seismic Fire Protection Design Tool may be accessed at www.seisbrace.com

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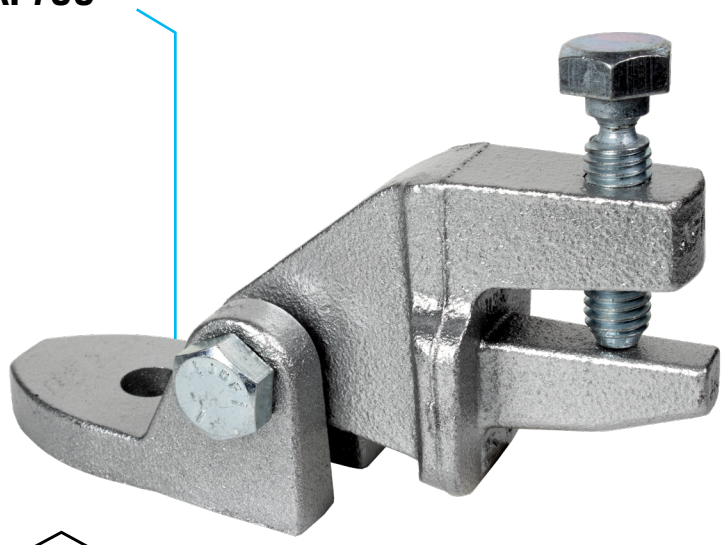
Building connections that last™

ASC Engineered Solutions

Universal Swivel Attachment
Fig. AF700



c UL us LISTED FM APPROVED

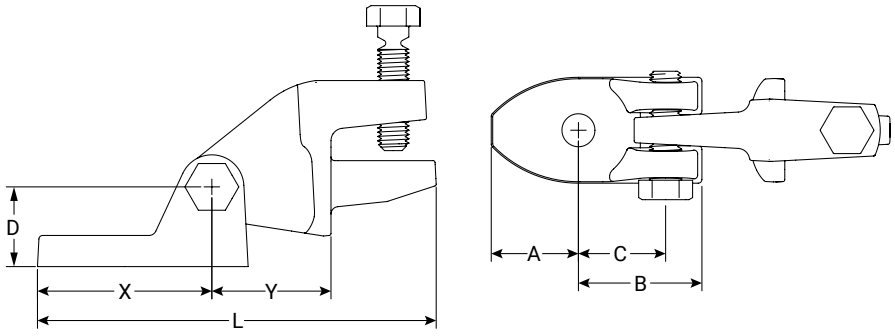


FIG. AF700 Dimensions and Weight

A	B	C	D	L	X	Y	Weight
In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	lbs/kgs
1.40 35.56	1.983 50.37	1.400 35.56	1.280 32.51	6.40 162.6	2.80 71.1	1.91 48.5	2.25 1.02

Notes:

ASC Engineered Solutions™ brand bracing components are designed to be compatible ONLY with other ASC Engineered Solutions brand bracing components, resulting in a Listed seismic bracing assembly. Updated UL listing information may be viewed at www.ul.com and updated FM approval information may be viewed at www.approvalguide.com.

Material Specifications

Size Range
Brace Member: See Table
Anchors: ½"- ¾" (M12—M18)

Material
Ductile Iron with Carbon Steel Hardware

Finish
☐ Plain
☐ Electro-Galvanized per ASTM B633

Service
A seismic swivel attachment designed to connect a brace member to the building structure or to a seismic structural attachment. The AF700 rigidly braces piping systems subjected to horizontal and vertical seismic loads.

Approvals
cULus Listed (ANSI/UL 203a)), FM Approved (FM 1950-13), & FM Tested (FM 1950-16). FM Tested (ANSI/FM 1950-16). Complies with NFPA 13, ASCE 7, IBC, & MSS SP-127 bracing requirements.

Features
- The set screw provides a visual indication that proper installation has been achieved
- Eliminates brace member eccentricity by concentrically loading 1" and 1 ¼" brace pipes

Ordering
Specify figure number, fastener size, finish and description.

Seis Brace® Seismic Fire Protection Design Tool may be accessed at www.seisbrace.com

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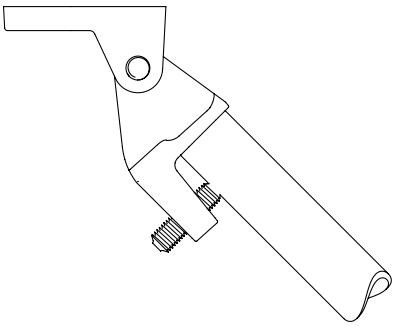
PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ Approved
Address:	☐ Approved as noted
Contractor:	☐ Not approved
Engineer:	Remarks:
Submittal Date:	
Notes 1:	
Notes 2:	

Universal Swivel Attachment
Fig. AF700

FIG. AF700 cULus Listing per ANSI/UL 203a (ASD)

Brace Member	Fastener Size	Horizontal Load Rating at Brace Angle			
		30°- 44°	45°- 59°	60°- 90°	Listed
1" – 2" Sch 40 Pipe (DN25 – DN50)	½"- ¾" (M12-M18)	942 lbf (4.19 kN)	1333 lbf (5.93 kN)	1632 lbf (7.26 kN)	1885 lbf (8.38 kN)

1) Load ratings may apply to NPFA 13 fastener orientations A, B, C, D, E, F, G, H, or I.
2) Brace Angles are determined from Vertical.
3) Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.
4) See table below for listed brace members.
5) Minimum safety factor of 2.2 in accordance with NFPA 13-2019 Section A.18.5.2.3.

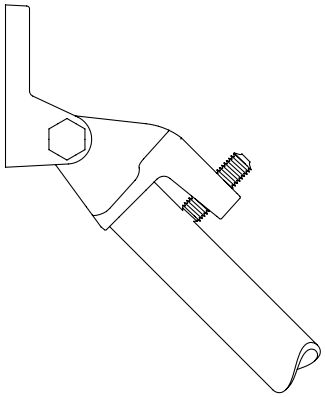


NFPA 13 Orientations A, B, or C

FIG. AF700 FM Approved (Listing) per FM 1950-13 (ASD)

Brace Member	Fastener Size	Horizontal Load Rating at Brace Angle			
		30°-44°	45°-59°	60°-74°	74°-90°
1" – 2" Sch 40 Pipe (DN25 – DN50)	½"- ¾" (M12-M18)	1780 lbf (7.92 kN)	2510 lbf (11.17 kN)	3080 lbf (13.70 kN)	3440 lbf (15.30 kN)

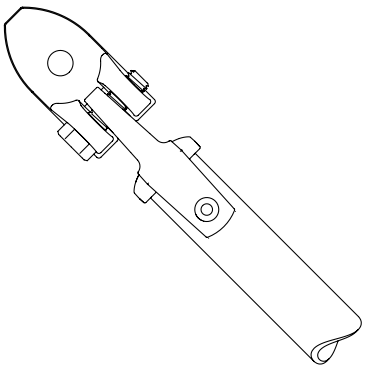
1) Load ratings may apply to NPFA 13 fastener orientations A, B, C, D, E, F, G, H, or I.
2) Brace Angles are determined from Vertical.
3) Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.
4) See table below for listed brace members.
5) Minimum safety factor of 1.5 in accordance with NFPA 13-2016 Section A.9.3.5.2.3. To convert the load ratings above to a safety factor of 2.2 per NFPA 13-2019 Section A.18.5.2.3, multiply load ratings by a factor of 0.68.
6) To convert to LRFD Load Ratings, ASD Load Ratings may be multiplied by a factor of 1.5.



NFPA 13 Orientations D, E, or F

FIG. AF700 FM Listed, Approved & Tested Brace Members

Brace Member	Brace Size	Standard (or Equivalent)	UL	FM
Sch. 40 NPS Pipe	1", 1¼", 1½", 2"	ASTM A53, A106,A135, or A795	✓	✓
Sch. 40 Metric Pipe	DN25	KS S 3562	✓	✓
	DN32	EN10255H		✓
Metric Pipe	DN40	GB/T 3091		✓
	DN50	JIS G3454		✓



NFPA 13 Orientations G, H, or I

FIG AF700 Horizontal Prying Factors (Pr) Per NFPA 13: Angles (Deg)

Fastener Orientation	A	B	C	D	E	F	G	H	I
Brace Angle	30°-44°	45°-59°	60°-90°	30°-44°	45°-59°	60°-90°	30°-44°	45°-59°	60°-90°
AF700	2.55	1.09	0.91	1.41	1.45	2.00	1.83	1.29	1.06
AF700 w/ Metal Deck[1]	2.55	1.09	1.14	–	–	–	–	–	–
AF700 w/ Metal Deck[2]	2.75	1.11	1.14	–	–	–	–	–	–

1) Prying factors reflect the baseplate "B" dimension overhanging the edge of the metal deck. Used for DeWalt anchor loads.
2) Prying factors reflect the baseplate "A" or "B" dimension overhanging the edge of the metal deck. Used for NFPA & Hilti anchor loads.
3) Prying Factors calculated in accordance with NFPA 13-2019 Section A.18.5.12.2.

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Universal Swivel Attachment
Fig. AF700

Method 1 – Connection to Brace Member First

1. Slide the brace member over the lower jaw until it contacts the back wall.
2. Hand tighten the set screw until it contacts the brace member. Continue to torque the set screw until the head breaks off.
3. Rotate the brace assembly up to the fastener or the related seismic structural attachment and connect through the mounting hole.
4. Tighten per the fastener or structural attachment specifications.
5. Ensure the brace angle is within the range specified.

Notes: The cross bolt should be hand tight. For visual inspection, at least one thread should be exposed.

Method 2 – Connection to Structure First

1. Connect the AF700 to the fastener or the related seismic structural attachment.
2. Tighten per the fastener or structural attachment specifications.
3. Slide the brace member over the lower jaw until it contacts the back wall.
4. Hand tighten the set screw until it contacts the brace member. Continue to torque the set screw until the head breaks off.
5. Rotate the brace member until the brace angle is within the specified range.

Notes: The cross bolt should be hand tight. For visual inspection, at least one thread should be exposed..

Structural Attachments, Anchors, & Fasteners Listed, Approved, & Tested with the AF700

Structural Attachment	Structure
AF085	Steel Joist (Top Chord)
AF086	Horizontal Steel Flange (I-Beam Bottom Flange)
AF772	Horizontal Steel Flange (I-Beam Bottom Flange)
AF778	Horizontal Steel Flange (I-Beam Top or Bottom Flange) C-Channel (Top or Bottom Flange) Vertical Flange of a Joist (Top Chord)
AF779	All Structures with the Applicable Approved Anchor or Fastener
DeWalt Power-Stud®+ SD1	Cracked Concrete Cracked Concrete Filled Metal Deck
DeWalt Power-Stud®+ SD2	Cracked Concrete Cracked Concrete Filled Metal Deck
DeWalt Wood-Knocker®II+	Cracked Concrete
DeWalt Bang-It®+	Cracked Concrete Filled Metal Deck
DeWalt DDI+™	Cracked Concrete Filled Metal Deck
Anchors & Fasteners Per NFPA 13	Cracked Concrete Cracked Concrete Filled Metal Deck Steel Wood Saw Lumber or Glue-Laminated Timbers

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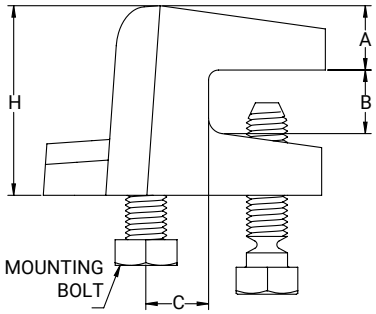
Universal Structural Brace Attachment
Fig. AF720



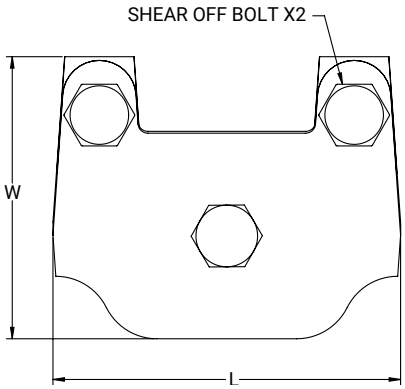


FIG. AF720: Dimensions and Weights

Mounting Bolt Size (diam.)	A	B	L	W	H	Weight
	In./mm	In./mm	In./mm	In./mm	In./mm	Lbs/kg
½	0.78 (19.8)	0.75 (19.1)	4.22 (107.2)	3.43 (87)	2.31 (58.7)	3.28 (1.49)

Notes:
ASC Engineered Solutions™ brand bracing components are designed to be compatible ONLY with other ASC Engineered Solutions brand bracing components, resulting in a Listed seismic bracing assembly. Updated UL listing information may be viewed at www.ul.com and updated FM approval information may be viewed at www.approvalguide.com.

Material Specifications

Size Range
Flange Thickness: 0.06"– ¾"

Material
Ductile Iron with Carbon Steel Hardware

Finish
☐ Plain
☐ Electro-Galvanized per ASTM B633

Service
A seismic structural attachment designed to attach to steel I-beams, steel columns and joists. The AF720 rigidly braces piping systems subjected to horizontal and vertical seismic loads.

Approvals
cULus Listed (ANSI/UL 203a) & FM Approved (FM 1950-13). Complies with NFPA 13, ASCE 7, IBC, & MSS SP-127 bracing requirements.

Features
- The set screw provides a visual indication that proper installation has been achieved
- May be used as an acceptable alternative to the Fig. AF778 in all applications
- May be installed anywhere a Fig 92 standard throat beam clamp may be installed.
- Includes all hardware needed for installation to structure and to swivel attachment

Ordering
Specify figure number, åfinish, and description.

Seis Brace® Seismic Fire Protection Design Tool may be accessed at www.seisbrace.com

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

ASC Engineered Solutions

Universal Structural Brace Attachment
Fig. AF720

FIG. AF720 cULus Listing per ANSI/UL 203a (ASD) with AF700

Structure	Load Orientation	Horizontal Load Rating at Brace Angle			
		30°-44°	45°-59°	60°-90°	Listed
		Lbf/(kN)	Lbf/(kN)	Lbf/(kN)	Lbf/kN
Horizontal Steel Flange and Vertical Steel Flange	Parallel to Flange Perpendicular to Flange	942 (4.19)	1333 (5.93)	1632 (7.26)	1885 (8.38)

1) Listed for installation with Fig. AF700
2) Brace Angles are determined from Vertical.
3) Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.
4) Minimum safety factor of 2.2 in accordance with NFPA 13-2019 Section A.18.5.2.3.

FIG. AF720 cULus Listing per ANSI/UL 203a (ASD) with AF771 or AF076

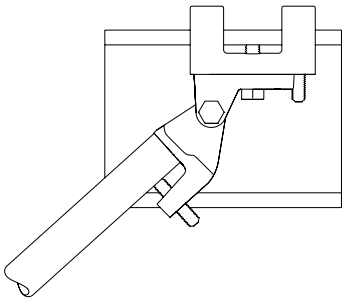
Structure	Load Orientation	Horizontal Load Rating at Brace Angle			
		30°-44°	45°-59°	60°-90°	Listed
		Lbf/(kN)	Lbf/(kN)	Lbf/(kN)	Lbf/kN
Horizontal Steel Flange and Vertical Steel Flange	Parallel to Flange Perpendicular to Flange	800 (3.56)	1131 (5.03)	1385 (6.16)	1600 (7.12)

1) Listed for installation with Fig. AF771, and AF076
2) Brace Angles are determined from Vertical.
3) Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.
4) Minimum safety factor of 2.2 in accordance with NFPA 13-2019 Section A.18.5.2.3.

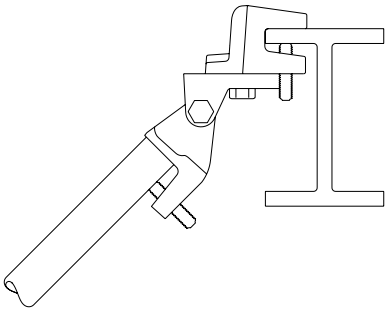
FIG. AF720 FM Approved (Listing) per FM 1950-13 (ASD)

Structure	Load Orientation	Flange Thickness	Horizontal Load Rating at Brace Angle			
			30°-44°	45°-59°	60°-74°	75°-90°
		In./(mm)	Lbf/(kN)	Lbf/(kN)	Lbf/(kN)	Lbf/kN
Horizontal Steel Flange	Parallel to Flange	0.125–0.750 (3.18–19.05)	1280 (5.69)	1840 (8.18)	2210 (9.83)	2470 (10.99)
	Perpendicular to Flange		1570 (6.98)	1490 (6.63)	1040 (4.63)	1150 (5.12)
Vertical Steel Flange	Parallel to Flange		870 (3.87)	1440 (6.41)	1230 (5.47)	1360 (6.05)
	Perpendicular to Flange		1038 (4.58)	2260 (10.05)	2490 (11.08)	2750 (12.23)

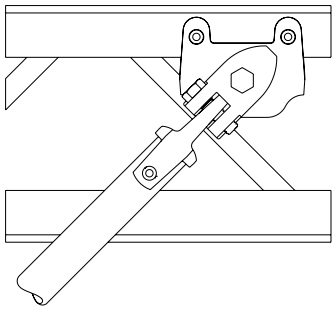
1) Listed for installation with Fig. AF700 & AF771
2) Brace Angles are determined from Vertical.
3) Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.
4) Minimum safety factor of 1.5 in accordance with NFPA 13-2016 Section A.9.3.5.2.3. To convert the load ratings above to a safety factor of 2.2 per NFPA 13-2019 Section A.18.5.2.3, multiply load ratings by a factor of 0.68.
5) To convert to LRFD Load Ratings, ASD Load Ratings may be multiplied by a factor of 1.5.



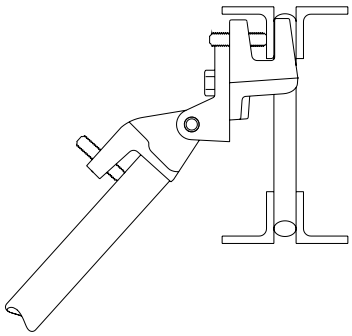
Horizontal Steel Flange (I-Beam)
Seismic Load Parallel to the Flange



Horizontal Steel Flange (I-Beam)
Seismic Load Perpendicular to the Flange



Vertical Steel Flange (Joist)
Seismic Load Parallel to the Flange



Vertical Steel Flange (Joist)
Seismic Load Perpendicular to the Flange

Installation Instructions

1. Place the AF720 on a horizontal or vertical steel flange.
2. Hand tighten the set screws until they contact the flange. Continue to torque the set screws until the heads break off.
3. Mount the AF700, AF771, or AF076 to the ½" mounting bolt. The mounting bolt shall be installed wrench tight (typically finger tight plus ¼ to ½ turns).

Note: When installed with the AF700, AF771, or AF076, the lowest load rating at angle shall control the load rating of the assembly.

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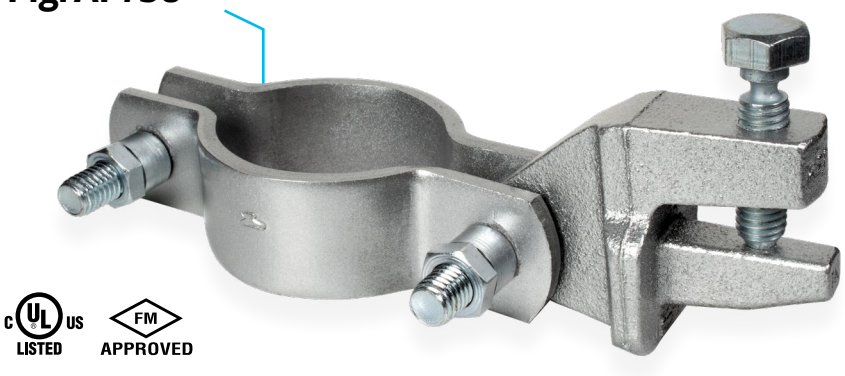
Longitudinal & Lateral Seismic Clamp
Fig. AF730



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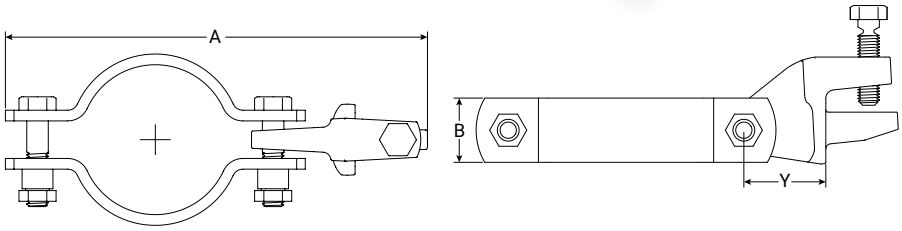


FIG. AF730 Dimensions and Weight

Size	A In./mm	B In./mm	Y In./mm	Weight lbs/kgs
1" (DN25)	7.6 193	1.50 38.1	1.91 48.5	2.49 1.13
1½" (DN32)	8.0 203			2.55 1.13
1½" (DN40)	8.2 208			2.64 1.20
2" (DN50)	8.7 221			2.78 1.26
2½"	9.2 234			2.92 1.32
3" (DN80)	9.8 249			3.13 1.42
4" (DN100)	10.8 274			3.38 1.53
5"	12.1 307			3.81 1.73
6"	13.2 335			4.12 1.87
8"	15.2 386			6.40 2.90
10"	18.1 460			7.60 3.45
12"	20.1 511			8.60 3.90

Notes:
ASC Engineered Solutions™ brand bracing components are designed to be compatible ONLY with other ASC Engineered Solutions brand bracing components, resulting in a Listed seismic bracing assembly. Updated UL listing information may be viewed at www.ul.com and updated FM approval information may be viewed at www.approvalguide.com.

Material Specifications

Size Range
Service Pipe Size: 1" – 12", DN25–DN100

Material
Carbon Steel Clamp and Hardware. Ductile Iron Brace Member Attachment Fitting.

Finish
- ☐ Plain
- ☐ Clamp: Hot Dipped Galvanized per ASTM A153
- ☐ Brace Member Attachment Fitting: Electro-Galvanized per ASTM B633

Service
A seismic longitudinal and lateral brace clamp designed to connect a piping system to a brace member. The AF730 rigidly braces piping systems subjected to horizontal and vertical seismic loads.

Approvals
cULus Listed (ANSI/UL 203a) and FM Approved (FM 1950–13). FM Tested (ANSI/FM 1950–16). Complies with NFPA 13, ASCE 7, IBC, & MSS SP–127 bracing requirements.

Features
- Torque off set screw and nuts provide a visual indication that the desired installation torque values have been achieved.

Ordering
Specify figure number, service pipe size, finish, and description.

Seis Brace® Seismic Fire Protection Design Tool may be accessed at www.seisbrace.com

AFCON
An ASC Engineered Solution

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

ASC Engineered Solutions

Longitudinal & Lateral Seismic Clamp
Fig. AF730

FIG. AF730 cULus Listing per ANSI/UL 203a (ASD)

Service Pipe Size	Standard Service Pipe	Specialty Service Pipe	Horizontal Load Rating at Brace Angle							
			Longitudinal Load Rating				Lateral Load Rating			
			30°-44°	45°-59°	60°-90°	Listed	30°-44°	45°-59°	60°-90°	Listed
			lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN
1" (DN25)	Sch. 10 Sch. 40 Metric Pipe	Mega-Thread MLT / GL Eddy Thread EZ-Thread	340 1.51	480 2.14	588 2.62	680 3.02	340 1.51	480 2.14	588 2.62	680 3.02
1¼" (DN32)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread								
1½" (DN40)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread Fire-Flo EZ-Thread	375 1.67	530 2.36	649 2.89	750 3.34	375 1.67	530 2.36	649 2.89	750 3.34
2" (DN50)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread Fire-Flo EZ-Thread								
2½"	Sch. 10 Sch. 40	Mega-Flow Eddy Flow Fire-Flo	545 2.42	770 3.43	943 4.19	1090 4.85	545 2.42	770 3.43	943 4.19	1090 4.85
3" (DN80)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo								
4" (DN100)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo								
5"	Sch. 10 Sch. 40	–								
6"	Sch. 10 Sch. 40	Mega-Flow	942 4.19	1333 5.93	1632 7.26	1885 8.38	942 4.19	1333 5.93	1632 7.26	1885 8.38
8"	Sch. 10 0.188" Wall Sch. 40	–								
10"	0.188" Wall Sch. 40	–								

Brace Angles are determined from Vertical.

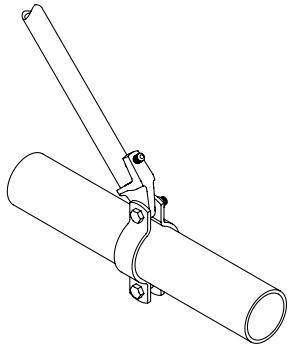
Sch. 10 & 0.188" Wall Load Ratings may be used for any thicker wall pipe of the same diameter.

Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.

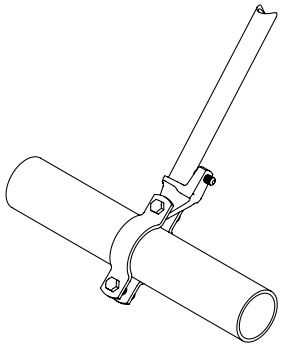
See table on page 4 for UL listed specialty pipes & UL Listed metric service pipes.

See table on page 4 for UL listed brace members.

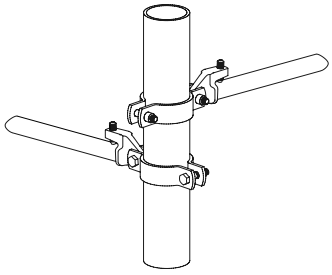
Load ratings include a minimum safety factor of 2.2 in accordance with NFPA 13-2019 Section A.18.5.2.3.
All load ratings may be used for NFPA 13-2016 designs.



Longitudinal Application



Lateral Application



Riser Application

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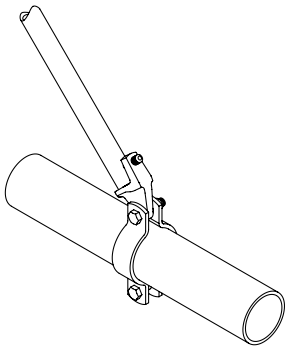
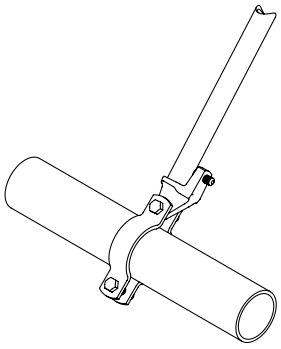
Longitudinal & Lateral Seismic Clamp
Fig. AF730

FIG. AF730 FM Approved (Listing) per FM 1950-13 (ASD)

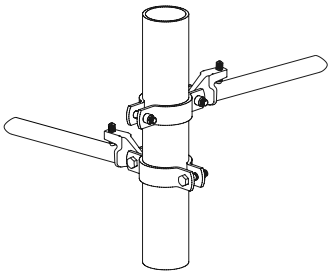
Service Pipe Size	Standard Service Pipe	Specialty Service Pipe	Horizontal Load Rating at Brace Angle							
			Longitudinal Load Rating				Lateral Load Rating			
			30˚-44˚	45˚-59˚	60˚-74˚	75˚-90˚	30˚-44˚	45˚-59˚	60˚-74˚	75˚-90˚
			lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN
1" (DN25)	Sch. 10 Sch. 40 Metric Pipe	Mega-Thread MLT / GL Eddy Thread EZ-Thread	550 2.24	640 2.84	670 2.98	740 3.29	1740 7.74	2460 10.94	3010 13.39	3360 14.95
1¼" (DN32)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread	740 3.29	680 3.02	820 3.65	1620 7.21	1430 6.36	2020 8.99	2480 11.03	2770 12.32
1½" (DN40)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread Fire-Flo EZ-Thread	800 3.56	650 2.89	790 3.51	1800 8.01	1790 7.96	2530 11.25	3100 13.79	3460 15.39
2" (DN50)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread Fire-Flo EZ-Thread	830 3.69	990 4.4	1190 5.29	1620 7.21	1820 8.1	2580 11.48	3160 14.06	3530 15.7
2½"	Sch. 10 Sch. 40	Mega-Flow Eddy Flow Fire-Flo	800 3.65	700 3.11	850 3.78	1930 8.59	1610 7.16	2280 10.14	2790 12.41	3120 13.88
3" (DN80)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo	960 4.27	1330 5.92	1540 6.85	1700 7.56	1550 6.89	2200 9.79	2690 11.97	3010 13.39
4" (DN100)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo	760 3.38	1040 4.63	1270 5.65	1400 6.23	1260 5.6	1790 7.96	2190 9.74	2440 10.85
5"	Sch. 10 Sch. 40	–	890 3.96	1230 5.47	1410 6.27	1550 6.89	1260 5.6	1790 7.96	2190 9.74	2440 10.85
6"	Sch. 10 Sch. 40	Mega-Flow	700 3.11	940 4.18	1140 5.07	1310 5.83	950 4.23	1340 5.96	1640 7.3	1830 8.14
8"	0.188" Wall Sch. 40	–	990 4.4	1130 5.03	1360 6.05	1520 6.76	1540 6.85	2170 9.65	2660 11.82	2970 13.21
10"	0.188" Wall Sch. 40	–	1020 4.54	850 3.78	1000 4.45	1100 4.89	1700 7.56	2410 10.72	2950 13.12	3290 14.63
12"	0.188" Wall Sch. 40	–	970 4.31	1010 4.49	1220 5.43	1430 6.36	1690 7.52	2390 10.63	2930 13.03	3270 14.55



Longitudinal Application



Lateral Application



Riser Application

Brace Angles are determined from Vertical.

Sch. 10 & 0.188" Wall Load Ratings may be used for any thicker wall pipe of the same diameter.

Load ratings include a minimum safety factor of 1.5 in accordance with NFPA 13-2016 Section A.9.3.5.2.3. To convert the load ratings above to a safety factor of 2.2 per NFPA 13-2019 Section A.18.5.2.3, multiply load ratings by a factor of 0.68.

To convert to LRFD Load Ratings, ASD Load Ratings may be multiplied by a factor of 1.5.

See table on page 4 for FM approved metric service pipes.

See table on page 4 for FM approved brace members.

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Longitudinal & Lateral Seismic Clamp
Fig. AF730

Method 1 – Connection to Brace Member First

1. Slide the brace member over the lower jaw until it contacts the back wall of the brace member attachment fitting.
2. Hand tighten the set screw until it contacts the brace member. Continue to torque the set screw until the head breaks off.
3. Rotate the brace assembly to the service pipe. Unbolt the back nut & bolt and rotate the clamp halves over the service pipe. Re-assemble the nut and bolt.
4. Hand tighten the nuts on both sides of the clamp. Evenly and alternately torque the nut until the head breaks off. It is best practice to tighten the nut at the jaw side first.
5. Ensure the brace angle is within the range specified.

Method 2 – Connection to Service Pipe First

1. Unbolt the back nut & bolt and rotate the clamp halves over the service pipe. Re-assemble the nut and bolt.
2. Hand tighten the nuts on both sides of the clamp. Evenly and alternately torque the nut until the head breaks off. It is best practice to tighten the nut at the jaw side first.
3. Slide the brace member over the lower jaw until it contacts the back wall of the brace member attachment fitting.
4. Hand tighten the set screw until it contacts the brace member. Continue to torque the set screw until the head breaks off.

FIG. AF730 cULus Listed & FM Approved Brace Members

Brace Member	Sizes	Standards (or Equivalent)	UL Listed	FM Approved
Sch. 40 NPS Pipe	1", 1¼", 1½", 2"	ASTM A53, A106, A135, or A795	✓	✓
Sch. 40 Metric Pipe	DN25, DN32, DN40, DN50	KS D 3562	✓	✓
Metric Pipe		EN10255H		✓
		GB/T 3091		✓
		JIS G3454		✓

FIG. AF730 cULus Listed & FM Approved Metric Service Pipes

Brace Member	Service Pipe Sizes	UL Listed	FM Approved
KS D 3507 KS D 3537	DN25, DN32, DN40, DN50, DN 80, DN100	✓	✓
KS D 3562 Sch. 40		✓	✓
GB/T 3091 GB/T 3092			✓
JIS G3452			✓
EN 10255M			
EN 10255H			

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