Product Data Sheet
June 2013
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Rosemount 1595 Conditioning Orifice Plate

- Discharge coefficient uncertainty of ±0.5%
- Conditioning orifice plate is based on AGA, ASME, and ISO industry standards
- Can be installed between standard orifice flanges

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Contents

Rosemount 1595 Conditioning Orifice Plate

Rosemount 1595 Conditioning Orifice combines a flow conditioner with an orifice plate into a highly accurate primary element.

- Requires only 2 diameters of straight pipe run upstream and downstream from a flow disturbance
- Suitable for most gas, liquid, and steam applications
- Available in 2 to 24-in. (50 - 600 mm) line sizes

Additional Information
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Installation and Flowmeter Orientation: Click Here

Table 1. Rosemount 1595 Conditioning Orifice Plate Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
1595	Conditioning Orifice Plate	
Plate Type		
Standard		**Standard**
P	Paddle, Square Edged	★
U[(1)(2)]	Universal, Square Edged	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
030	3-in. (76 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Expanded		
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
Flange Rating		

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Standard				**Standard**
A1	ANSI Class 150 Raised Face (*Note: Not compatible with standard ASME B16.36 Orifice Flanges)*			★
A3	ANSI Class 300 Raised Face			★
A6	ANSI Class 600 Raised Face			★
A9	ANSI Class 900 Raised Face			★
AF	ANSI Class 1500 Raised Face			★
AT	ANSI Class 2500 Raised Face			★
D1[(1)]	DIN PN 10 (only available with Plate Type P)			★
D2[(1)]	DIN PN 16 (only available with Plate Type P)			★
D3[(1)]	DIN PN 25 (only available with Plate Type P)			★
D4[(1)]	DIN PN40 (only available with Plate Type P)			★
D5[(1)]	DIN PN 63 (only available with Plate Type P)			★
D6[(1)]	DIN PN 100 (only available with Plate Type P)			★
Expanded				
R3[(1)]	ANSI Class 300 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)			
R6[(1)]	ANSI Class 600 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)			
R9[(1)]	ANSI Class 900 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)			
RF[(1)]	ANSI Class 1500 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)			
RT[(1)]	ANSI Class 2500 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)			
Material Type				
Standard				**Standard**
S	316/316L Stainless Steel			★
Expanded				
M	Alloy 400			
H	Alloy C-276			
Orifice Plate Thickness		**Plate Type P**	**Plate Type U**	
Standard				**Standard**
A	0.125-in.	Line Sizes 2 to 4-in. (50 to 100 mm)	Line size 2 to 6-in. (50 to 150 mm)	★
B	0.250-in.	Line Sizes 6 to 12-in. (150 to 300 mm)	Line size 8 to 12-in. (200 to 300 mm)	★
Expanded				
C	0.375-in.	Line Sizes 14 to 20-in. (350 to 500 mm)	N/A	
D	0.500-in.	Line Size 24-in. (600 mm)	N/A	
Beta Ratio				
Standard				**Standard**
020	0.20 Beta Ratio			★
040	0.40 Beta Ratio			★
065	0.65 Beta Ratio (0.60 beta ratio for Line Size option 020 only)			★

Table 1. Rosemount 1595 Conditioning Orifice Plate Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Flow Calibration		
Standard		**Standard**
WC	Flow Calibration Certification (3 points)	★
Expanded		
WD	Discharge Coefficient Verification (full 10 points)	
Plate Holder		
Expanded		
PH(1)	Plate Holder for Universal Type Orifice Plate for use with RTJ flange or section	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
Special Inspection		
Standard		**Standard**
QC1	Visual and dimensional Inspection with certification	★
QC7	Inspection and performance certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Certification per ISO 10474 3.1-B and EN 10204 3.1	★
Code Conformance		
Expanded		
J5(3)	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Typical Model Number: 1595 P 060 A3 S A 040		

(1) Currently available up to 12-in. (300 mm) line size.

(2) For use with a plate holder device in RTJ type flanges or orifice fittings.

(3) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

Rosemount 1595 specifications

Rosemount 1595 performance specifications

Flow coefficient uncertainty

Table 2. Discharge Coefficient Uncertainty

Beta Ratio[1]	Cd Uncertainty[2]
β = 0.20	±0.50%
β = 0.40	±0.50%
β = 0.65	±1.00% (applicable for Beta > 0.4)

(1) For 0.65 beta and ReD< 10,000 add an additional 0.5% to the Discharge Coefficient Uncertainty.

(2) When using the Calibration Factor (Fc) supplied.

Sizing

Contact an Emerson Process Management representative for assistance. A Configuration Data Sheet is required prior to order for application verification.

Pressure tap orientation

Orient the 1595 Conditioning Orifice Plate so that the pressure taps are centered between any 2 (of 4) orifice bore holes. In addition, the pressure taps should be located at 90° to the plane of the last upstream elbow under these conditions:

- with less than 6 upstream pipe diameters
- with a 0.65 Beta

The 1595 Conditioning Orifice Plate can be used with the following pressure taps:

- Corner pressure taps - all beta sizes
- Flange pressure taps - all beta sizes
- Radius pressure taps (D and D/2) - 0.4 beta size or smaller

Centering requirements

The 1595 should be installed so that it is centered in the pipes as recommended by ISO-5167.

1595 Functional Specifications

Service and Flow Range

Liquid, gas or steam turbulent flow, for pipe Reynold's Numbers greater than 5,000. For pipe Reynold's Numbers less than 10,000 add an additional +0.5% uncertainty to the discharge coefficient uncertainty.

Pipe Sizes

2 to 24-in. (50 to 600 mm). Contact Emerson Process Management for other pipe sizes.

Operating limits

For line sizes 2-in. (50 mm) to 24-in. (600 mm)

Temperature Range: –320 to 1200 °F (–196 to 649 °C)

- – 320 to 800 °F (–196 to 427 °C) and differential pressure up to 800 inH_20
- 800 to 1200 °F (427 to 649 °C) and differential pressure up to 400 inH_20

Maximum working pressure

- Flange rating per ANSI B16.5 and DIN EN 1092-1.

Rosemount 1595 physical specifications

Material of construction

Table 3. 1595 Materials of Construction

Code	Description	ASTM	UNS	DIN (W.-Nr.)
S	316/316L SST	A240 Gr 316/316L	S31600 / S31603	1.4401/1.4404 (1.4436/1.4435)
H	Alloy C-276	B575 Gr N10376	N10276	2.4819
M	Alloy 400	B127 Gr N04400	N04400	2.4360

Flange Mounting Hardware

- The 1595 can be used with the Rosemount 1496 Flange Union.

Rosemount 1496 Orifice Flange Union

Standard flange styles are raised face (RF) weld neck, RF slip-on, or RF threaded for paddle type orifice plates, and ring type joint (RTJ) weld neck for universal type plates with plate holders. All flange unions are supplied with studs, nuts, jackscrews, gaskets, and pipe plugs. Table 5 lists standard pipe schedules.

- Meets ASME B16.36
- Meets DIN 19214 part 1
- Threaded tap connection provided 180-degrees apart
- The following options are available.
- Socket weld tap connections
- High temperature flange gaskets for temperatures greater than 500 °F (260 °C)
- Stainless Steel flange bolting per ASTM A193 Grade B8M/A194 Grade 8M

Orifice type

- Paddle, square-edge
- Universal, square-edge

Typical orifice hole sizes

Beta is calculated by: $\beta = d_C$ / Pipe ID, where the calculated bore is equal to 2 x typical orifice hole size ($d_C = 2d$). The table below shows the diameter of each of the four orifice holes.

Table 4. Typical Orifice Hole Sizes (Measurement in inches (millimeters)

Line Size	Pipe ID	Beta (β) = 0.20 d	Beta (β) = 0.40 d	Beta (β) = 0.65 d
2-in. (50 mm)	2.067-in. (52.502 mm)	0.207 (5.26)	0.413 (10.49)	0.620 (15.75) (1)
3-in. (76 mm)	3.068-in. (77.927 mm)	0.307 (7.80)	0.614 (15.60)	0.997 (25.32)
4-in. (100 mm)	4.026-in. (102.26 mm)	0.403 (10.25)	0.805 (20.45)	1.309 (32.22)
6-in. (150 mm)	6.065-in. (154.051 mm)	0.607 (15.42)	1.213 (30.81)	1.971 (50.06)
8-in. (200 mm)	7.981-in. (202.717 mm)	0.798 (20.27)	1.596 (40.54)	2.594 (65.89)
10-in. (250 mm)	10.02-in. (254.51 mm)	1.002 (25.45)	2.004 (50.90)	3.257 (82.73)
12-in. (300 mm)	12.00-in. (304.80 mm)	1.200 (30.48)	2.400 (60.96)	3.900 (99.06)
14-in. (350 mm)	13.124-in. (333.35 mm)	1.312 (33.32)	2.625 (66.68)	4.265 (108.33)
16-in. (400 mm)	15.000-in. (381.00 mm)	1.500 (38.10)	3.000 (76.20)	4.875 (123.83)
18-in. (450 mm)	16.876-in. (428.65 mm)	1.688 (42.88)	3.375 (85.73)	5.485 (139.32)
20-in. (500 mm)	18.812-in. (477.82 mm)	1.881 (47.78)	3.762 (95.55)	6.114 (155.30)
24-in. (600 mm)	22.624-in. (574.65 mm)	2.262 (57.45)	4.525 (114.94)	7.353 (186.77)

(1) For 2-in. (50.8 mm) line size, the beta (β) is 0.60.

Table 5. Default Pipe Schedules(1)(2)

Nominal Pipe Size(3)	ANSI 300# (WN, TH, SO)	ANSI 600# (WN, RJ)	ANSI 900# (WN, RJ)	ANSI 1500# (WN, RJ)	ANSI 2500# (WN, RJ)
2 (51)	Standard	Standard	XS	XS	160
2½- (64)	Standard	Standard	XS	XS	
3 (76)	Standard	Standard	XS		
4 (102)	Standard	Standard	XS		
6 (152)	Standard	Standard	XS		
8 (203)	Standard	Standard			
10 (254)	Standard	XS			
12 (305)	Standard	XS			
14 (356)	Standard				
16 (406)	Standard				
18 (457)	Standard				
20 (508)	Standard				
24 (610)	XS				

(1) If no default schedule provided - customer must specify pipe schedule.

(2) Standard wall thickness for DIN weldneck flanges is per ISO EN 1092-1 (2002). Consult factory if different wall thickness is required.

(3) Size in inches (millimeters).

Dimensional drawings

Rosemount 1595 Conditioning Orifice Plate

(ANSI Flange, Paddle, Square edged)

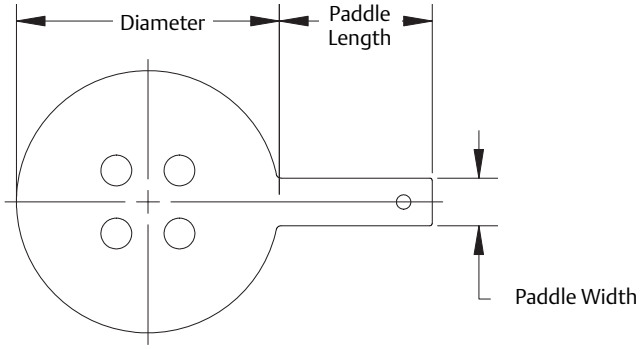


Table 6. Paddle Type Orifice Plate Dimensions in inches (millimeters)

Line Size	Diameter for Paddle Type						Paddle Length	Paddle Width
	150#	300#	600#	900#	1500#	2500#		
2 -in. (50 mm)	4.125 (104.78)	4.375. (111.13)	4.375 (111.13)	5.625 (142.875)	5.625 (142.875)	5.750 (146.050)	4.0 (101.6)	1.0 (25.4)
3-in. (76 mm)	5.375 (136.53)	5.875 (149.23)	5.875 (149.23)	6.625 (168.275)	6.875 (174.625)	7.750 (196.85)	4.0 (101.6)	1.0 (25.4)
4-in. (100 mm)	6.875 (174.63)	7.125 (180.98)	7.625 (193.68)	8.125 (206.35)	8.250 (209.550)	9.250 (234.95)	4.0 (101.6)	1.0 (25.4)
6-in. (150 mm)	8.750 (222.25)	9.875 (250.83)	10.500 (266.7)	11.375 (288.925)	11.125 (282.575)	12.500 (317.50)	4.0 (101.6)	1.0 (25.4)
8-in. (200 mm)	11.000 (279.4)	12.125 (307.98)	12.625 (320.675)	14.125 (358.775)	13.875 (352.425)	15.250 (387.350)	6.0 (152.4)	1.5 (38.1)
10-in. (250 mm)	13.375 (339.73)	14.250 (361.95)	15.750 (400.05)	17.125 (434.975)	17.125 (434.975)	18.750 (476.25)	6.0 (152.4)	1.5 (38.1)
12-in. (300 mm)	16.125 (409.58)	16.625 (422.26)	18.000 (457.2)	19.625 (498.475)	20.500 (520.7)	21.625 (549.275)	6.0 (152.4)	1.5 (38.1)
14-in. (350 mm)	17.750 (450.85)	19.125 (485.78)	19.375 (492.125)				6.0 (152.4)	1.5 (38.1)
16-in (400 mm)	20.250 (514.35)	21.250 (539.75)	22.250 (565.15)				6.0 (152.4)	1.5 (38.1)
18-in. (450 mm)	21.500 (546.1)	23.375 (593.725)	24.000 (609.6)				6.0 (152.4)	1.5 (38.1)
20-in. (500 mm)	23.750 (603.25)	25.625 (650.875)	26.750 (679.45)				6.0 (152.4)	1.5 (38.1)
24-in. (600 mm)	28.125 (714.375)	30.375 (771.525)	31.000 (787.4)				6.0 (152.4)	1.5 (38.1)

NOTE: Consult factory for availability of line sizes and flange ratings not shown in the above table.

1595U Orifice Universal Type (Universal, Square edged)

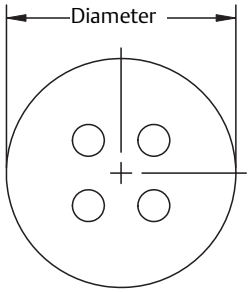


Table 7. A.P.I Ring No.'s and Rating

Line Size	Diameter for Universal Type	A.P.I Ring No.	Rating (lbs.)
2-in. (50 mm)	2.437-in. (61.8998 mm)	R-23	300-600
		R-24	900-1500
		R-26	2500
3-in. (76 mm)	3.437-in. (87.2998 mm)	R-31	300-600 & 900
		R-32	2500
		R-35	1500
4-in. (100 mm)	4.406-in. (111.912 mm)	R-37	300-600 & 900
		R-38	2500
		R-39	1500
6-in. (150 mm)	6.437-in. (163.5 mm)	R-45	300-600 & 900
		R-46	1500
		R-47	2500
8-in. (200 mm)	8.437-in. (214.3 mm)	R-49	300-600 & 900
		R-50	1500
		R-51	2500
10-in. (250 mm)	10.687-in. (271.45 mm)	R-53	300-600 & 900
		R-54	1500
		R-55	2500
12-in. (300 mm)	12.593-in. (319.862 mm)	R-57	300-600 & 900
		R-58	1500
		R-59	2500

Note
Refer to Table 6 for line size and pressure rating availability.

Rosemount 1595 Conditioning Orifice Plate
(DIN Flange, Paddle, Square edged)

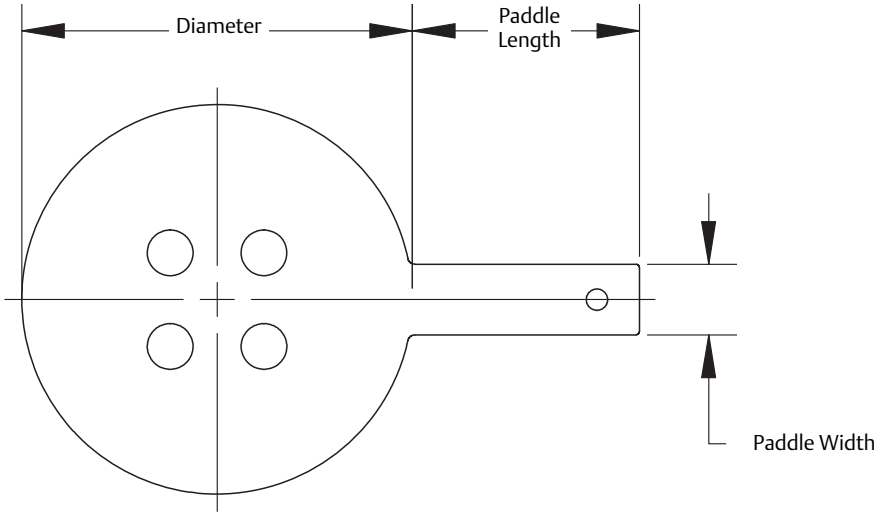


Table 8. 1595 Conditioning Orifice Plate Dimensions in millimeters (inches)

Line Size	Diameter (max) – by flange rating						Paddle Length	Paddle Width
	PN 10	PN 16	PN 25	PN 40	PN 63/64	PN 100		
DN 50 (2-in.)	107 (4.21)	107 (4.21)	107 (4.21)	107 (4.21)	113 (4.45)	119 (4.69)	101.6 (4.0)	25.4 (1.0)
DN 80 (3-in.)	142 (5.60)	142 (5.60)	142 (5.60)	142 (5.60)	148 (5.82)	154 (6.06)	101.6 (4.0)	25.4 (1.0)
DN 100 (4-in.)	162 (6.38)	162 (6.38)	168 (6.61)	168 (6.61)	174 (6.85)	180 (7.09)	101.6 (4.0)	25.4 (1.0)
DN 150 (6-in.)	218 (8.58)	218 (8.58)	224 (8.82)	224 (8.82)	247 (9.72)	257 (10.12)	101.6 (4.0)	25.4 (1.0)
DN 200 (8-in.)	273 (10.74)	273 (10.74)	284 (11.18)	290 (11.42)	309 (12.17)	324 (12.76)	152.4 (6.0)	38.1 (1.5)
DN 250 (10-in.)	328 (12.91)	329 (12.95)	340 (13.39)	352 (13.86)	364 (14.33)	391 (15.39)	152.4 (6.0)	38.1 (1.5)
DN 300 (12-in.)	378 (14.88)	384 (15.12)	400 (15.75)	417 (16.42)	424 (16.69)	458 (18.03)	152.4 (6.0)	38.1 (1.5)

NOTE: Consult factory for availability of line sizes and flange ratings not shown in the above table.

Table 9. Conditioning Orifice Plate Available Beta Ratio (β)
The table below shows the available Beta Ratio (β) for line size vs. pipe schedule

Line Size	Pipe Schedule	Beta (β) Available	Line Size	Pipe Schedule	Beta (β) Available
2	≤ 80	0.20, 0.40, 0.60	14	≤ 80	0.20, 0.40, 0.65
2	160	0.20	14	100	0.20, 0.40
3	≤ 80	0.20, 0.40, 0.65	14	120	0.20, 0.40
3	160	0.20, 0.40	14	140	0.20, 0.40
3	XXS	0.20	14	160	0.20, 0.40
4	≤ 80	0.20, 0.40, 0.65	14	XXS	0.20, 0.40
4	120	0.20, 0.40	16	≤ 80	0.20, 0.40, 0.65
4	160	0.20, 0.40	16	100	0.20, 0.40
4	XXS	0.20	16	120	0.20, 0.40
6	≤ 80	0.20, 0.40, 0.65	16	140	0.20, 0.40
6	120	0.20, 0.40	16	160	0.20, 0.40
6	160	0.20, 0.40	16	XXS	0.20, 0.40
6	XXS	0.20	18	≤ 80	0.20, 0.40, 0.65
8	≤ 80	0.20, 0.40, 0.65	18	100	0.20, 0.40, 0.65
8	100	0.20, 0.40, 0.65	18	120	0.20, 0.40
8	120	0.20, 0.40	18	140	0.20, 0.40
8	140	0.20, 0.40	18	160	0.20, 0.40
8	160	0.20, 0.40	18	XXS	0.20, 0.40
8	XXS	0.20, 0.40	20	≤ 80	0.20, 0.40, 0.65
10	≤ 80	0.20, 0.40, 0.65	20	100	0.20, 0.40, 0.65
10	100	0.20, 0.40, 0.65	20	120	0.20, 0.40
10	120	0.20, 0.40	20	140	0.20, 0.40
10	140	0.20, 0.40	20	160	0.20, 0.40
10	160	0.20, 0.40	20	XXS	0.20, 0.40
10	XXS	0.20, 0.40	24	≤ 80	0.20, 0.40, 0.65
12	≤ 80	0.20, 0.40, 0.65	24	100	0.20, 0.40
12	100	0.20, 0.40	24	120	0.20, 0.40
12	120	0.20, 0.40	24	140	0.20, 0.40
12	140	0.20, 0.40	24	160	0.20, 0.40
12	160	0.20, 0.40	24	XXS	0.20, 0.40
12	XXS	0.20, 0.40			

1595 Pressure Tap Orientation

Orient the 1595 Conditioning Orifice Plate so that the pressure taps are centered between any 2 (of 4) orifice bore holes. In addition, the pressure taps should be located at 90° to the plane of the last upstream elbow under these conditions:

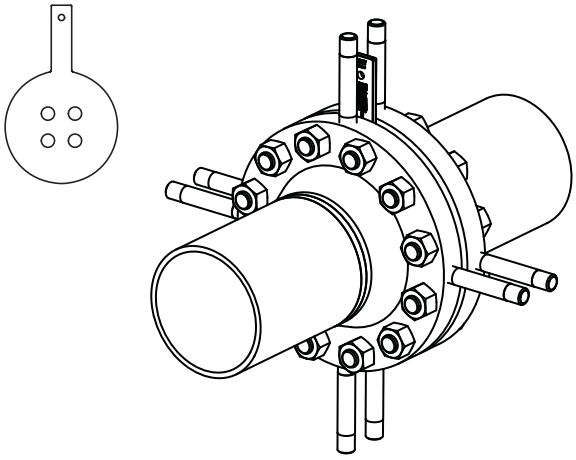
- with less than 6 upstream pipe diameters
- with a .65 Beta

Pressure Tap Locations

At Least Six Upstream Pipe Diameters

If the installation location has at least six upstream pipe diameters, the pressure taps can be located between any two of the four holes of the 1595 Orifice Plate. See Figure 1.

Figure 1. 1595 Pressure Tap Locations



Within Six Diameters Of An Elbow

If the installation location has less than six upstream pipe diameters, the pressure taps can be located between any two of the four holes of the 1595 Orifice Plate. In addition, the pressure taps must be located 90° from the plane of the elbow. See Figure 2 and Figure 3.

Figure 2. 1595 Pressure Tap Locations

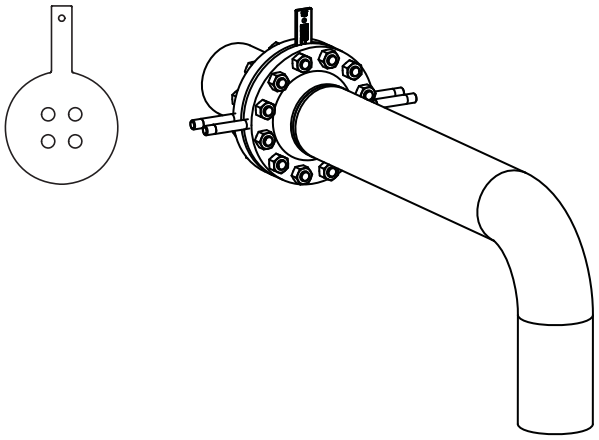
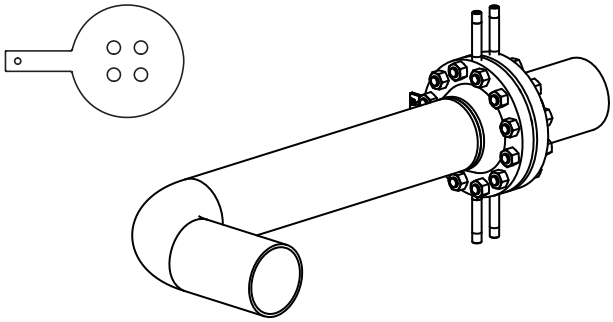


Figure 3. 1595 Pressure Tap Locations



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