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 most flow disturbances
- Suitable for most gas, liquid, and steam applications
- Available in 2 to 24-in. (50 - 600 mm) line sizes

Additional Information
Specifications: page 160
Dimensional Drawings: page 217
Installation and Flowmeter Orientation: page 181

Ordering information

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		
P	Paddle, Square Edged	★
U[(1)(2)]	Universal, Square Edged	★
Line size		
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)	★
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		
A1	ANSI Class 150 Raised Face (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)	★

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.

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				
S	316/316L Stainless Steel			★
M	Alloy 400			
H	Alloy C-276			
Orifice plate thickness		**Plate type P**	**Plate type U**	
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)	★
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				
020	0.20 Beta Ratio			★
040	0.40 Beta Ratio			★
050	0.50 Beta Ratio			★
065	0.65 Beta Ratio (0.60 beta ratio for Line Size option 020 only)			★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Flow calibration		
WD	Discharge Coefficient Verification (full 10 points)	
Plate holder		
PH[1]	Plate Holder for Universal Type Orifice Plate for use with RTJ flange or section	
Special cleaning		
P2	Cleaning for Special Services	
Special inspection		
QC1	Visual and dimensional Inspection with certification	★
QC7	Inspection and performance certificate	★
Material traceability certification		
Q8	Material Certification per ISO 10474 3.1-B and EN 10204 3.1	★
Code conformance		
J5[3]	NACE MR-0175 / ISO 15156	

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.

Country certification		
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.

Specifications

Performance specifications

Flow coefficient uncertainty

Table 2. Discharge Coefficient Uncertainty

Beta ratio [1]	Cd uncertainty[2]	
	With WD calibration	Standard
β = 0.20	±0.50%	±1.00%
β = 0.40	±0.50%	±1.00%
β = 0.50	±1.00%	±1.50%
β = 0.65	±1.00%	±1.50%

(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. To complete the Configuration Data Sheet go to: http://www3.emersonprocess.com/Rosemount/DP_Flow/Application/Pages/PCDefault.aspx

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 any of 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.

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

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.

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 ($d_C = 2d$). Table 4 shows the diameter of each of the four orifice holes.

Table 4. Typical Orifice Hole Sizes

Line size	Pipe ID	Beta (β) = 0.20 d	Beta (β) = 0.40 d	Beta (β) = 0.50 d	Beta (β) = 0.65 d
2-in (50.8 mm)	2.067-in. (52.502 mm)	0.207 (5.26)	0.413 (10.49)	0.517 (13.13)	0.620 (15.75)(1)
3-in. (76.2 mm)	3.068-in. (77.927 mm)	0.307 (7.80)	0.614 (15.60)	0.767 (19.48)	0.997 (25.32)
4-in. (101.6 mm)	4.026-in. (102.26 mm)	0.403 (10.25)	0.805 (20.45)	1.007 (25.57)	1.308 (32.22)
6-in. (152.4 mm)	6.065-in. (154.051 mm)	0.607 (15.42)	1.213 (30.81)	1.516 (38.52)	1.971 (50.06)
8-in. (203.2 mm)	7.981-in. (202.717 mm)	0.798 (20.27)	1.596 (40.54)	1.995 (50.68)	2.594 (65.89)
10-in. (254.0 mm)	10.02-in. (254.508 mm)	1.002 (25.45)	2.004 (50.90)	2.505 (63.63)	3.257 (82.73)
12-in. (304.8 mm)	12.00-in. (304.8 mm)	1.200 (30.48)	2.400 (60.96)	3.000 (76.2)	3.900 (99.06)
14-in. (355.6 mm)	13.124-in. (333.35 mm)	1.312 (33.32)	2.625 (66.68)	3.281 (83.34)	4.265 (108.33)
16-in. (406.4 mm)	15.000-in. (381.00 mm)	1.500 (38.10)	3.000 (76.20)	3.750 (95.25)	4.875 (123.83)
18-in. (457.2 mm)	16.876-in. (428.65 mm)	1.688 (42.88)	3.375 (85.73)	4.219 (107.16)	5.485 (139.32)
20-in. (508.0 mm)	18.812-in. (477.82 mm)	1.881 (47.78)	3.762 (95.55)	4.703 (119.46)	6.114 (155.30)
24-in. (609.6 mm)	22.624-in. (574.65 mm)	2.262 (57.45)	4.525 (114.94)	5.656 (143.66)	7.353 (186.77)

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

1595 dimensional drawings

Rosemount 1595 Conditioning Orifice Plate

(ANSI flange, paddle, square edged)

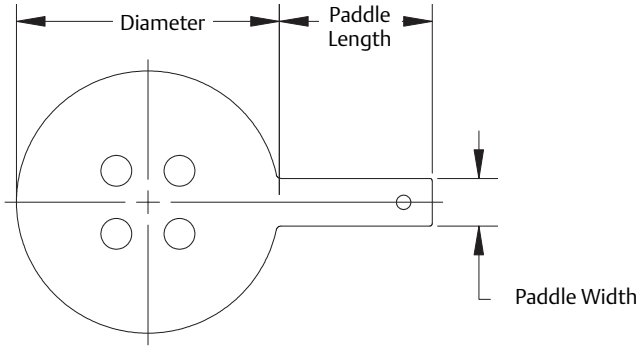

Table 33. Paddle Type Orifice Plate

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)	N/A	N/A	N/A	6.0 (152.4)	1.5 (38.1)
16-in (400 mm)	20.250 (514.35)	21.250 (539.75)	22.250 (565.15)	N/A	N/A	N/A	6.0 (152.4)	1.5 (38.1)
18-in. (450 mm)	21.500 (546.1)	23.375 (593.725)	24.000 (609.6)	N/A	N/A	N/A	6.0 (152.4)	1.5 (38.1)
20-in. (500 mm)	23.750 (603.25)	25.625 (650.875)	26.750 (679.45)	N/A	N/A	N/A	6.0 (152.4)	1.5 (38.1)
24-in. (600 mm)	28.125 (714.375)	30.375 (771.525)	31.000 (787.4)	N/A	N/A	N/A	6.0 (152.4)	1.5 (38.1)

Dimensions in inches (millimeters).

Note

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

1595U Orifice universal type (Universal, square edged)

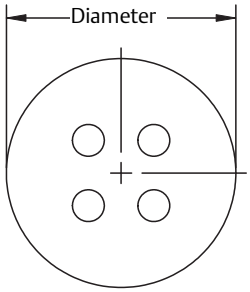

Table 34. A.P.I Ring No.'s and Rating

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 33 for line size and pressure rating availability.

Rosemount 1595 Conditioning Orifice Plate
(DIN flange, paddle, square edged)

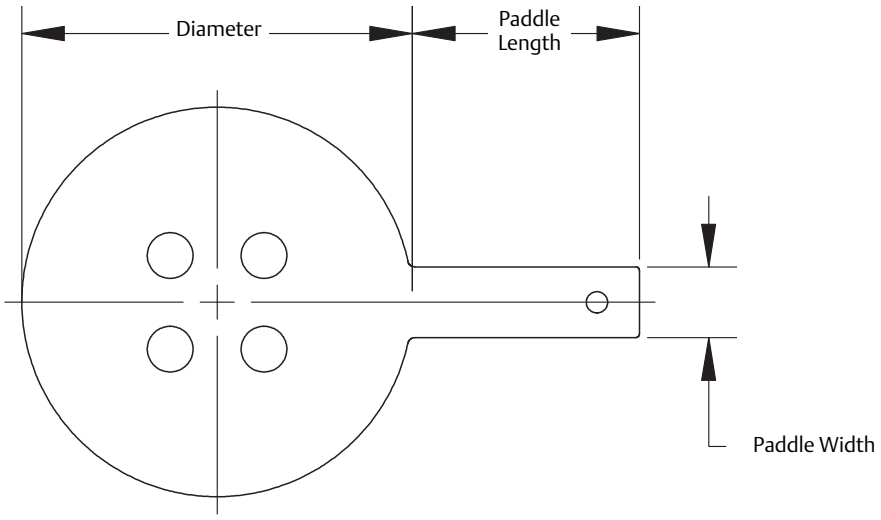

Table 35. 1595 Conditioning Orifice Plate

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)

Dimensions in millimeters (inches).

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

Table 36. 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
2	≤ 80	0.20,0.40,0.50,0.60
2	160	0.20
2	XXS	0.20
3	≤ 80	0.20, 0.40, 0.50, 0.65
3	160	0.20, 0.40, 0.50
3	XXS	0.20
4	≤ 80	0.20, 0.40, 0.50, 0.65
4	120	0.20, 0.40, 0.50
4	160	0.20, 0.40, 0.50
4	XXS	0.20
6	≤ 80	0.20, 0.40, 0.50, 0.65
6	120	0.20, 0.40, 0.50
6	160	0.20, 0.40
6	XXS	0.20
8	≤ 80	0.20, 0.40, 0.50, 0.65
8	100	0.20, 0.40, 0.50, 0.65
8	120	0.20, 0.40, 0.50
14	≤ 80	0.20, 0.40,0.50, 0.65
14	100	0.20, 0.40, 0.50
14	120	0.20, 0.40, 0.50
14	140	0.20, 0.40, 0.50
14	160	0.20, 0.40
16	≤ 80	0.20, 0.40,0.50, 0.65
16	100	0.20, 0.40, 0.50
16	120	0.20, 0.40, 0.50
16	140	0.20, 0.40, 0.50
16	160	0.20, 0.40
18	≤ 80	0.20, 0.40,0.50, 0.65
18	100	0.20, 0.40,0.50, 0.65
18	120	0.20, 0.40, 0.50
18	140	0.20, 0.40, 0.50
18	160	0.20, 0.40, 0.50
8	140	0.20, 0.40, 0.50
8	160	0.20, 0.40
8	XXS	0.20, 0.40, 0.50
10	≤ 80	0.20, 0.40, 0.50, 0.65
10	100	0.20, 0.40, 0.50, 0.65
10	120	0.20, 0.40, 0.50
10	140	0.20, 0.40, 0.50
10	160	0.20, 0.40
10	XXS	0.20, 0.40, 0.50
12	≤ 80	0.20, 0.40, 0.50, 0.65
12	100	0.20, 0.40, 0.50
12	120	0.20, 0.40, 0.50
12	140	0.20, 0.40, 0.50
12	160	0.20, 0.40
12	XXS	0.20, 0.40, 0.50
20	≤ 80	0.20, 0.40,0.50, 0.65
20	100	0.20, 0.40,0.50, 0.65
20	120	0.20, 0.40, 0.50
20	140	0.20, 0.40, 0.50
20	160	0.20, 0.40, 0.50
24	≤ 80	0.20, 0.40,0.50, 0.65
24	100	0.20, 0.40
24	120	0.20, 0.40, 0.50
24	140	0.20, 0.40, 0.50
24	160	0.20, 0.40, 0.50