

PFS-OP Orifice Plate for Flow Measurement

General Description:

The PFS-OP orifice plate in line sizes from 1/2" and above is one of the most common differential pressure type flow elements for the measurement of clean liquids, gasses and low-velocity vapor (steam) flow. Of the many design varieties described in technical manuals, codes and standards, the most prevalent configuration in the United States of America is the square-edged concentric paddle type orifice plate in combination with flange tapped carriers.

This design offers the optimum flexibility for applications with many diverse existing piping schemes as well as considerable economies available in terms of capital investment associated with the initial purchase of equipment. The design provides the means for relatively easy replacement of the orifice plate when necessitated by changes in the nominal flow rates in a given application installation or as might be required due to deterioration of accuracy performance of the installation. The operation of the flow element is based upon the Bernoulli principle and relies upon the comparison of the pressure upstream and downstream (differential pressure) of the constriction represented by the orifice plate bore to infer the rate of flow of the line fluid through the bore diameter. Unlike other differential pressure flow elements such as venturi type meters where the line fluid upstream and downstream of the constriction are generally and variously conditioned the energy consumed by the line fluid flowing through the orifice metering

Applications:

The PFS-OP is designed to measure full pipe, clean gasses or liquids over extreme temperature or low velocity vapor or steam. Typical applications include potable water, high pressure steam, combustion air, compressor surge control, oxygen & nitrogen measurement for air separation plants, petrochemical and chemical plants process measurement and control (alcohol, ethylene, chlorine, etc.)

Material of Construction:

Typical material selections for standard application orifice plates are 304 or 316 stainless steel. Other options for material selection are Monel, Hastelloy, Titanium and brass. All equipment is available cleaned for oxygen service if required.

All plates are stamped with identification data including material grade, bore size, line size, flange rating and tag number

Design and Manufacturing Standards:

- All materials are mill certified and of first quality
- All applicable codes and standards are considered such as A.G.A., the I.S.A., the A.N.S.I., and A.P.I. recommendations.
- Each orifice plate is manufactured with strict adherence to ISO 9001 certification standards thereby applying numerous inspections at key points in the production process assuring the squareness and sharpness of the bore edge remains well within the tolerances permitted by the above referenced codes and standards.

PFS Orifice Model Numbers:

PFS-OP Orifice Plate

PFS-OFU Orifice, Union, Flanged

PFS-OFU Orifice, Union, Flanged, Run

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Orifice Plates & Flanged Unions



Product Specifications:

Accuracy:

+/-0.25% (Calibrated), +/-0.5% to +/-0.75% Beta dependent.

The accuracy of the orifice plate is directly contingent upon the presence of the sharp edge in the orifice bore.

Range Ability:

10:1 or more depending on secondary group capabilities and arrangement.

Operating Conditions:

Line Fluid Capability:

Gas or liquid full pipe flow.

Clean with minimal particulate contamination.

Temperature Range:

Cryogenic to Superheated Steam.

-400° F to 1250° F (as limited only by the materials of construction and capabilities of the associated secondary device(s) used.)

Line Pressure Capacity:

From full vacuum to the limits of materials.

Line Size Capability:

Unlimited, between 1/2" and above.

Beta Ratio Capability:

Custom sized and designed for Beta ratio range between 0.30 through 0.75.

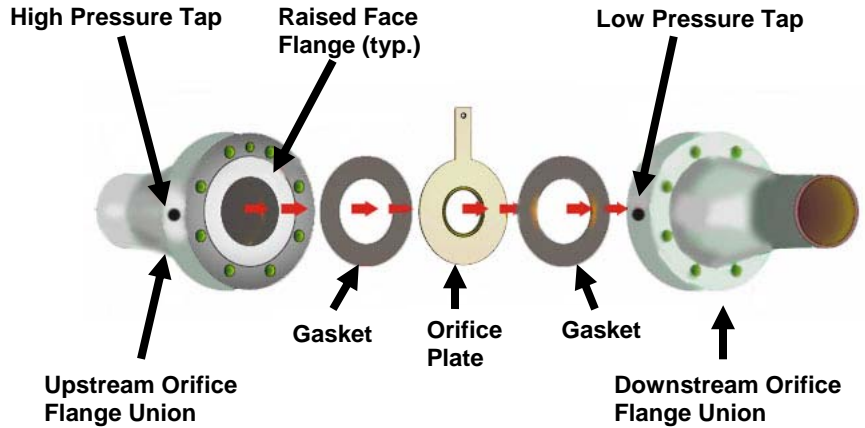
Pipe Reynolds Number R_D Capability:

Discharge coefficient is constant above 75,000 R_D . Discharge coefficient bias and random error between 12,000 R_D and 75,000 R_D is empirically established and highly repeatable.

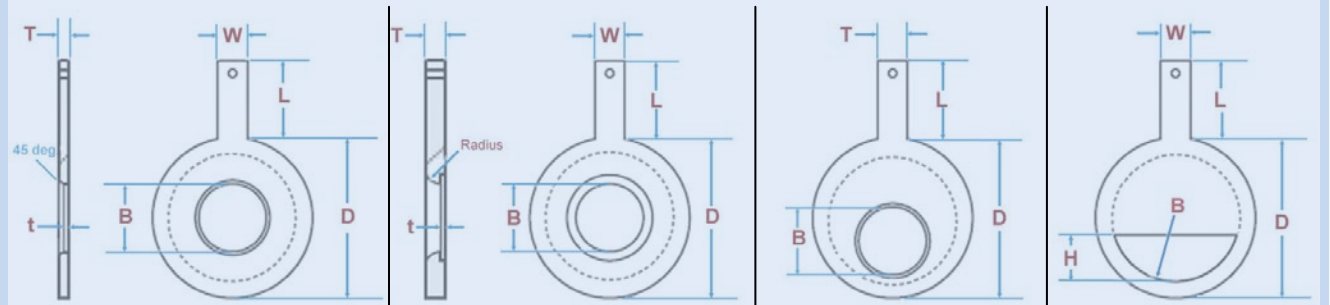
Permanent Pressure Loss:

Varies from 30% of differential and up depending on application conditions, beta ratio, and exit cone truncation ratio and can be engineered to meet your requirements.

In installations other than the Integral Orifice design, the orifice plate is held between a set of flanges, known as an orifice flange union, separated by suitable gaskets. These flange unions are specially machined to include the appropriate pressure tap sets that in conjunction with the orifice plate, will provide a means of obtaining the high and low pressure signals, and thus the differential.



Dashed line represents the pipe I.D.



Square Edge Concentric

Clean liquid, gas, vapor line fluids. Suitable for standard service requirements and with special material selection for harsh service.

Quadrant Edged

For high viscosity, low Reynolds number applications. Plate thickness and rounded edge contribute to greater durability and useful plate life.

Eccentric Bore

When bore is tangent to 98% of top line I.D. then entrained gases will pass the orifice. When at bottom, entrained solids will pass.

Segmental Bore

For fluids containing heavy sediments, B is 98% of line I.D. and H is height of circular segment.

NOMINAL PIPE SIZE (inches)	ANSI 125# 150#	ANSI 250# 300#	ANSI 400#	ANSI 600#	ANSI 900#	ANSI 1500#	ANSI 2500#	FOR ALL PRESSURE RATINGS					
	D	D	D	D	D	D	D	L	W	(AGA) T	t	Blank Weight (lbs)	(ISA) T
1/2"	1.875	2.125	2.125	2.125	2.500	2.500	2.750	4	1	.125	.015	1	.125
3/4"	2.250	2.625	2.625	2.625	2.750	2.750	3.000	4	1	.125	.015	1	.125
1"	2.625	2.875	2.875	2.875	3.125	3.125	3.375	4	1	.125	.020	1	.125
1-1/4"	3.000	3.250	3.250	3.250	3.500	3.500	4.125	4	1	.125	.020	1	.125
1-1/2"	3.375	3.750	3.750	3.750	3.875	3.875	4.625	4	1	.125	.030	1	.125
2"	4.125	4.375	4.375	4.375	5.625	5.625	5.750	4	1	.125	.030	1	.125
2-1/2"	4.875	5.125	5.125	5.125	6.500	6.500	6.625	4	1	.125	.030	1	.125
3"	5.375	5.875	5.875	5.875	6.625	6.875	7.750	4	1	.125	.030	1	.125
4"	6.875	7.125	7.000	7.625	8.125	8.250	9.250	4	1	.125	.060	2	.125
5"	7.750	8.500	8.375	9.500	9.750	10.000	11.000	4	1	.125	.060	2	.125
6"	8.750	9.875	9.750	10.500	11.375	11.125	12.125	6	1-1/2	.125	.060	3	.125
8"	11.000	12.125	12.000	12.625	14.125	13.875	15.250	6	1-1/2	.125	.125	5	.125
10"	13.375	14.250	14.125	15.750	17.125	17.125	18.750	6	1-1/2	.125	.125	7	.125
12"	16.125	16.250	16.500	18.000	19.625	20.500	21.625	6	1-1/2	.250	.250	18	.125
14"	17.750	19.125	19.000	19.375	20.500	22.750		6	1-1/2	.250	.250	24	.125
16"	20.250	21.250	21.125	22.250	22.625	25.250		6	1-1/2	.375	.375	40	.250
18"	21.500	23.375	23.250	24.000	25.000	27.625		6	1-1/2	.375	.375	50	.250
20"	23.750	25.625	25.375	26.750	27.375	29.625		6	1-1/2	.375	.375	65	.250
22"	26.000	27.750	27.500	28.875				6	1-1/2	.375	.375	72	.250
24"	28.125	30.375	30.125	31.000	32.875	35.500		6	1-1/2	.375	.375	90	.250
30"	34.625	37.375	37.250	38.125				6	1-1/2	.500	.500	160	.250
36"	41.125	43.875	43.875	44.375				6	1-1/2	.500	.500	220	.375



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