

Datasheet

Orifice plate – multi-holes

Rev.1 Feb 2016

- ✓ Suitable if little space available
- ✓ Accuracy, repeatability and reliability of the flow element
- ✓ Non-standardized flow element but designed and manufactured according to ISO5167 standard requirements (sharp edge)
- ✓ Easy and quick Installation and commissioning
- ✓ Very long life-time product
- ✓ Robust, cost-effective and maintenance-free system



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The multi-hole orifice plate is an element for flow measurement of any type of fluid. Due to its short requirements in terms of upstream and downstream straight lengths, it is especially suitable for tight spaces. Behaving as a flow straightener, this orifice plate allows ignoring possible irregular flow profiles and supplies a stable and accurate flow measurement.

Specifications



The multi-holes orifice plate helps to shorten upstream and downstream lengths. To be used when compact size is needed.

Applications – standards

ISO5167 standard	The multi-holes orifice plate is a non-standardized flow element but is designed and manufactured according to ISO5167 standard requirements.
<i>The sizing of multi-holes orifice plates is achieved in our design office with the same software as the one used for sharp-edge orifice plates in compliance with the ISO5167 standard.</i>	
Fluid temperature	-110°C to +800°C
Type of fluid	Gas, steam, liquid (one-phase)
Nominal diameters	ND50 to ND1000 (from 2 to 40 inches)
Maximum operating pressure	Limited by the flange rating

Features

Ratio pressure loss	42% to 77% of ΔP depending on β value
Accuracy	<1% to 2,5% depending on the installation
Material	Stainless steel, Carbon steel, Monel alloy, Hastelloys, Inconels, Duplex, Superduplex, Titanium, Tantalum, PVC, etc

Mounting

Assembly	Between flanges (RF or RTJ)
Piping connection	Useful upstream and downstream straight lengths : 2D minimum between orifice plate and any obstacle located up and downstream)
Type of gaskets	Flat seal (spiral wound gasket, graphite, PTFE) or RTJ (mild steel, stainless steel, monel alloy...)
Centering of orifice bore relative to piping	Distance e between the centerline of the orifice and the centerline of the pipe in the direction parallel to the pressure tapping : $e \leq 0,0025D / (0,1 + 2,3\beta^4)$

See drawings page 10 –
Recommendations for
pressure taps orientation

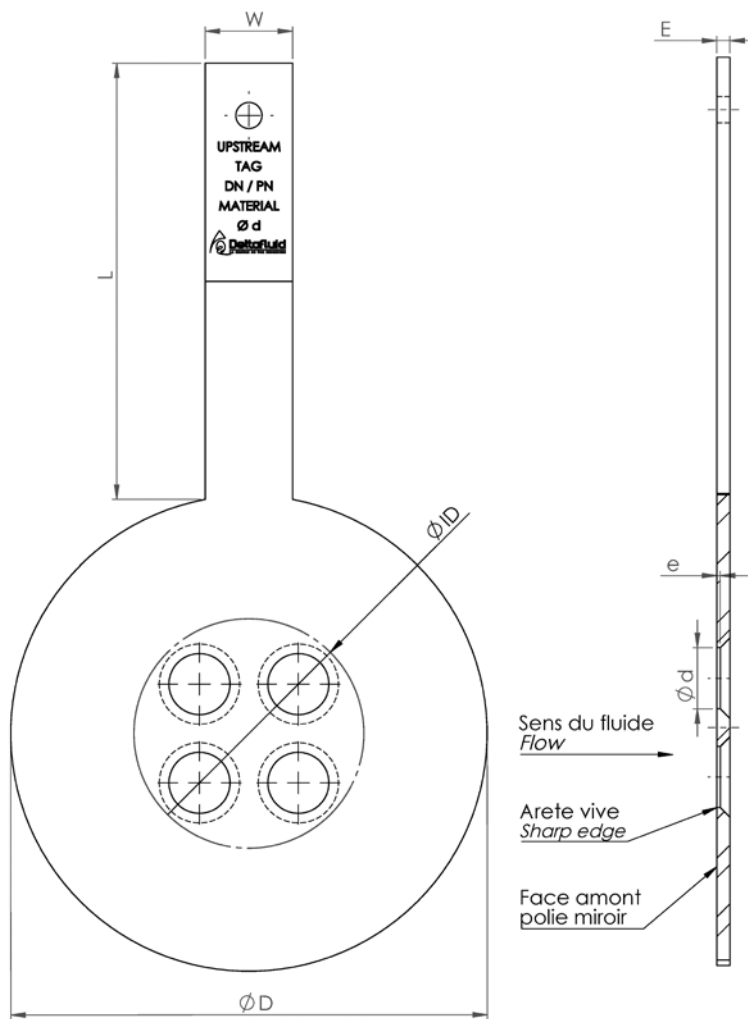


Pressure taps should be positioned and centered between 2 of the 4 bores of the plate so that upstream and downstream averaged pressures are taken into account.

Limits of use

Flange taps (25/25) Or Corner taps (0/0)	$0.2 \leq \beta \leq 0.65$ $Re_D \geq 5.000$
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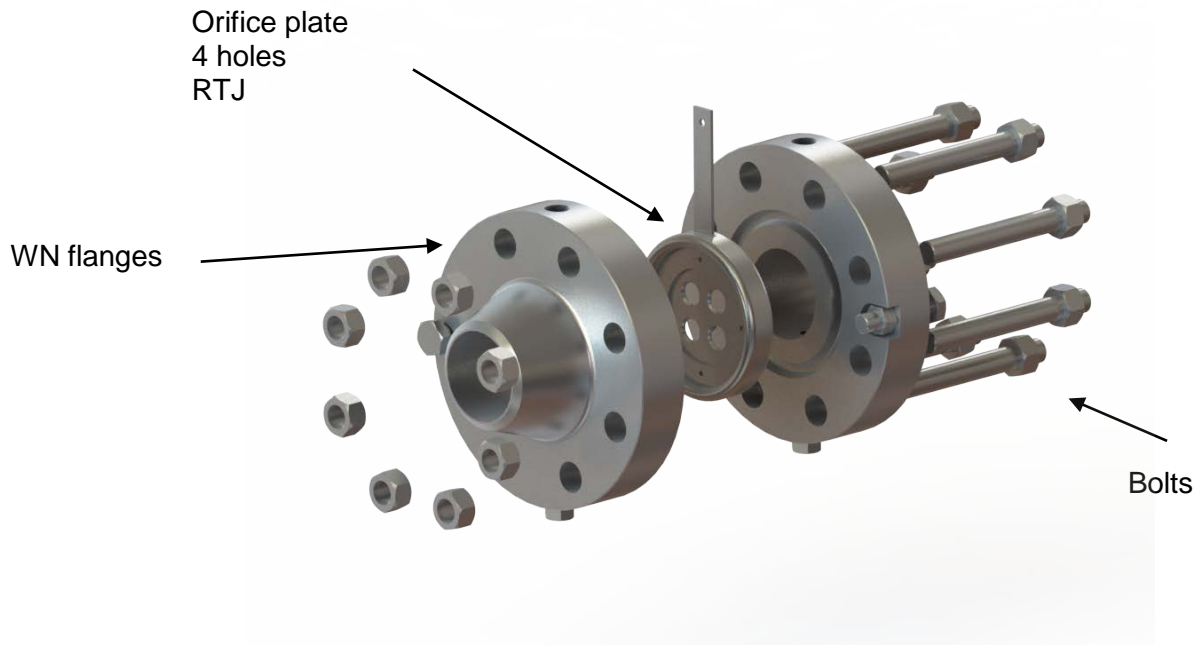
Dimensional drawings



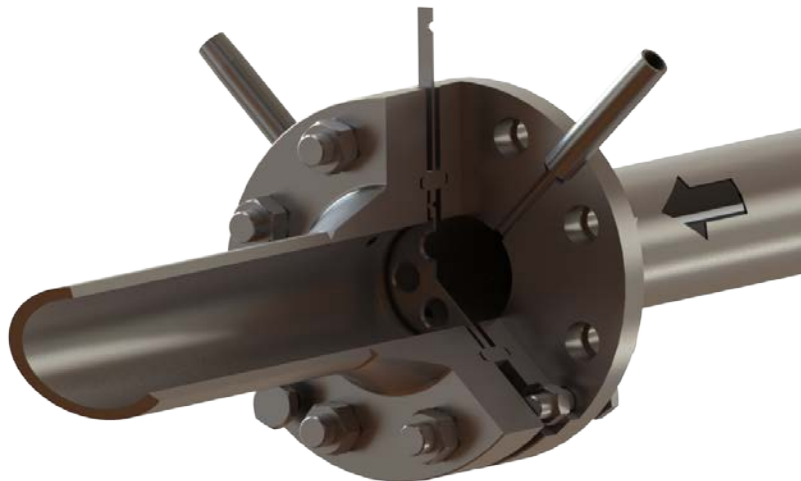
DN	E	e	L	W	Ø D : Orifice plate external diameter (mm)					
					150# RF	300# RF	600# RF	900# RF	1500# RF	2500# RF
1/2"	3	0,5	100	20	46	52	52	61	61	68
3/4"	3	0,5	100	20	55	65	65	68	68	74
1"	3	0,5	100	20	65	71	71	77	77	84
1" 1/2	3	0,8	100	20	84	93	93	96	96	115
2"	3	0,8	100	20	103	109	109	141	141	144
2" 1/2	3	1,2	100	20	122	128	128	163	163	166
3"	3	1,6	100	20	135	147	147	166	173	195
4"	3	1,6	150	25	173	179	192	204	208	233
6"	3	3	150	25	220	249	265	267	281	315
8"	3	3	150	25	277	306	319	357	350	385
10"	3	3	150	25	338	360	398	433	433	474
12"	3	3	150	25	408	420	455	496	519	547
14"	6	6	150	25	449	484	490	519	576	
16"	6	6	150	25	512	538	563	573	639	
18"	6	6	150	25	547	595	611	636	703	
20"	6	6	150	25	604	652	681	696	754	
24"	6	6	150	25	716	773	789	836	900	

Multi-holes orifice plate assembly

Orifice plate between Welding-Neck orifice flanges with pressure tapings 1 inch /1 inch
Example RTJ orifice plate – For a RF plate, provide appropriate flanges and gaskets.



Exploded view of a 4 holes RTJ orifice plate mounted between 2 Welding-Neck orifice flanges



*Sectional view of a 4 holes RTJ orifice plate mounted between 2 Welding-Neck orifice flanges – pressure tapings placed upwards (liquid)**

(*) see page 10 – Recommendations for pressure taps orientation for gas / liquid / steam applications

Examples – further multi-holes flow elements

Multi-holes flow element can be a simple orifice plate. Other different elements of various thicknesses are developed to meet customer's demand: what Deltafluid calls « **a monoblock system** » is one piece of a certain thickness machined with RF or RTJ faces and 4 bores according to the specifications, which includes as well orifices for pressure tapplings (or directly the pressure taps tubings). This makes installation and commissioning easier and avoids an incorrect mounting of the flow element on site.

Picture 1 : 4 holes RTJ monoblock system with 4 nipples for pressure tappings (location of the 4 pressure taps is a customer's specification) to be mounted between RTJ flanges



Picture 2 : 4 holes RTJ monoblock system with 2 nipples, pressure taps centered between 2 of the 4 bores

Picture 3 : 4 holes RF monoblock system with pressure taps holes



Picture 4 : 4 holes RF Compact flowmeter (2 integrated pressure taps) with manifold and differential pressure transmitter



Picture 5 : 4 holes RTJ compact flowmeter (2 integrated pressure taps)

Ordering information – MAIN CODE

Delta OP-	MAIN CODE							
Multi holes Orifice Plate	XXX	X	XX	XX	XXX	XXXXXX	XXX	XXX
Type of face								
Raising Face	RF*							
Ring Torque Joint	RTJ							
for RTJ :								
Male		M						
Female**		F						
in 1 piece or in 2 pieces								
Monobloc			MO					
Screwed - see plate support material			SC					
Type of finishing								
Polished 1 face				P				
Polished 2 faces				2P				
Others - SPECIFY				O				
Nominal diameter								
DN15 - 1/2"					1			
DN20 - 3/4"					0,75			
DN25 - 1"					1			
DN32 - 1"1/4					1,25			
DN40 - 1"1/2					1,5			
DN50 - 2"					2			
DN65 - 2"1/2					2,5			
DN80 - 3"					3			
DN100 - 4"					4			
DN125 - 5"					5			
DN150 - 6"					6			
DN200 - 8"					8			
DN250 - 10"					10			
DN300 - 12"					12			
DN350 - 14"					14			
DN400 - 16"					16			
DN450 - 18"					18			
DN500 - 20"					20			
DN600 - 24"					24			
Rating								
150#						A150		
300#						A300		
600#						A600		
900#						A900		
1500#						A1500		
2500#						A2500		
PN10						D10		
PN16						D16		
PN25						D25		
PN40						D40		
PN63						D63		
PN100						D100		

	MAIN CODE							XXX
	XXX	X	XX	XX	XXX	XXXXX	XXX	
Plate material								
Stainless steel 304							SS4	
Stainless steel 316							SS6	
Inconel							INC	
Monel							MON	
Hastelloy							HLY	
PTFE							PTF	
Duplex							DPX	
Superduplex							SDX	
Others - SPECIFY							O	
Plate support material	<i>for OP RTJ screwed</i>							
Stainless steel 304								SS4
Stainless steel 316								SS6
carbon steel								CS
Soft iron								SI
Others - SPECIFY								O
* OP-XX-RF can be assembled with simple or double & male or female facing depending on the flange								
** Pipe schedule or inner diameter ID to be specified								

Ordering information – OPTIONAL CODE

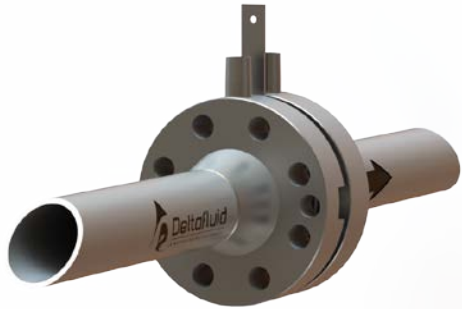
OPTIONAL CODE	XX	XX	XXX	XXX	XXX	X	XX	XX	XX	X	X
Mounting											
pressure taps 0/0 - <i>annular chamber</i>	0										
pressure taps 25/25 - <i>orifice flange</i>	25										
pressure taps D - D/2	D										
Flanges*⁽¹⁾											
Welding neck		WN									
Orifice welding neck		WO									
Slip on		SO									
Others		O									
Flanges material											
ASTMA105			105								
A350LF2			350								
Carbon steel* ⁽²⁾			CST								
Stainless steel 304			SS4								
Stainless steel 316			SS6								
Inconel			INC								
Monel			MON								
Hastelloy			HLY								
PTFE			PTF								
Duplex			DPX								
Superduplex			SDX								
Other			O								
Pipe Schedule											
5-5S				5							
10-10S				10							
20				20							
30				30							
40S-Std				STD							
40				40							
60				60							
XS-80S				XS							
80				80							
100				100							
120				120							
140				140							
160				160							
XXS				XXS							
Annular chamber material											
Carbon steel					CS						
Stainless steel 304					SS4						
Stainless steel 316					SS6						
Other					O						
Gaskets											
Flat						F					
Graphite						G					
Spiral wound						S					
PTFE						P					
Others						O					
Boltings material											
Carbon steel							CS				
Stainless steel							SS				
Others							O				

OPTIONAL CODE	XX	XX	XXX	XXX	XXX	X	XX	XX	XX	XX	X	X
Manifold												
3-way direct mounting									3D			
3-way remote mounting									3R			
5-way direct mounting									5D			
5-way remote mounting									5R			
DP Transmitter												
Standard										SD		
Multivariable										MV		
Temperature sensor^{*(3)}												
With temperature sensor											Y	
Without temperature sensor											N	
Piping^{*(4)}												
Upstream												U
Downstream												D
<p>*⁽¹⁾ OP-SE-RF can be assembled with simple or double & male or female facing depending on the flange</p> <p>*⁽²⁾ Type of carbon steel to be specified</p> <p>*⁽³⁾ Type of temperature sensor to be specified</p> <p>*⁽⁴⁾ Process connection to be specified</p>												

Recommendations for pressure taps orientation

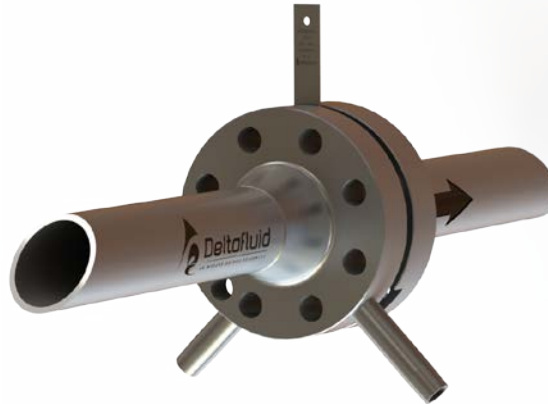
For more details on all possible pressure taps orientations and orifice plates mounting, please refer to the « User guide » document

Gas



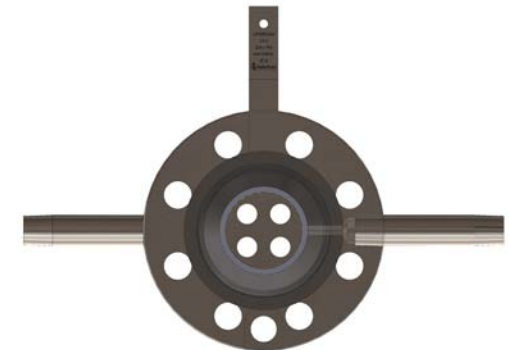
For gas application, pressure tapings are best oriented upwards.

Liquid



For liquid application, pressure tapings are best oriented downwards.

Steam



For steam application, pressure tapings are best positioned horizontally.