Datasheet

FLOW MEASUREMENT

CONDITIONING ORIFICE PLATE

KEY FEATURES

- Orifice plate design on the basis of the ISO5167-1 & ISO5167-2 or ASME.MFC.3M standards
- Recommended for gas, liquid or steam
- Pipe diameter : from 25 mm to 1 000 mm
- Reynolds number : from 5.000 to 10^8
- Accuracy : from 0,5% of the max flowrate
- Repeatabilty of measurement : 0,1%

Conditioning orifice plate

BENEFITS

- Short upstream and downstream straight lengths (2D upstream/2D downstream)
- Cost-effective solution : low installation cost and maintenance-free
- Easy and quick installation and commissioning
- Very long life-time product, no drift over time
- Suitable for a large range of fluids and process conditions

To be used if space is an issue

The conditioning orifice plate is named so because it behaves like a flow conditioner : its four orifices help stabilizing the flow. That is the reason why upstream and downstream straight lengths for a reliable measurement can be reduced.

STANDARDS

- Non-standardized equipment but designed and manufactured according to the following standards :
- ISO 5167-1 & ISO 5167-2
- ASME MFC-3M

TECHNICAL CHARACTERISTICS

- Fluid temperature(1) : cryogenic to +800°C
- Fluid type : gas, steam, monophasic liquid
- Materials(2) : carbon steel, stainless steel, monel, hastelloy, inconel, duplex, super duplex, titanium, tantalum, PVC, PTFE...
- Accuracy : from 0,5% of the max flowrate
- Maximum operating pressure : limited by the flange rating
- Characteristics according to the standard in force :

		ISO 5167-1&2	ASME MFC-3M
ReD	Reynolds number in the pipe	$5.000 \leq ReD \leq 10^8$	
D	Inside pipe diameter	$25\ mm \leq D \leq 1\ 000\ mm$	
d	Orifice diameter	$d \geq 6\ mm$	
β	d/D	$0,2 \leq \beta \leq 0,65$	
Ra	Upstream face roughness	$Ra < 10^4.d$	
r	Sharp adge radius	$r < 0,000\ 4.d$	
e	Orifice thickness	$0,005.D \leq e \leq 0,02.D$	
E	Plate thickness	$e \leq E \leq 0,05.D$	
α	Angle of the downstream bevel	$\alpha = 45° \pm 15°$	
t	Flatness tolerance	$t < 0,005.(D-d)/2$	

(1) No temperature restriction with a remote-mounted transmitter, otherwide +125°C max

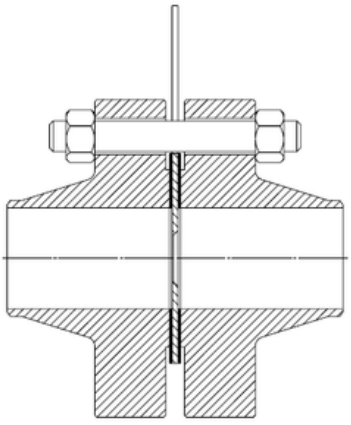
(2) For an agressive fluid, applying a specific coating on the sharp edges can increase the product lifetime

MOUNTING

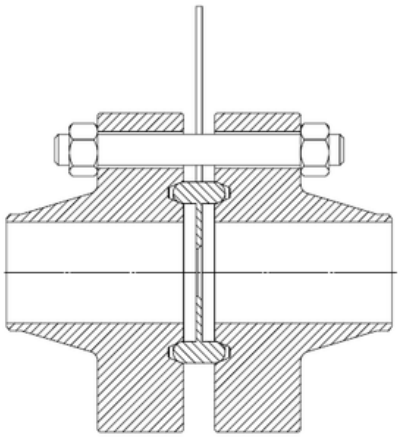
- Mounting between flanges or inserted between 2 carrier rings with annular slots (see page 5)
- Flange types : ISO PN 2,5 to PN 420, ASME 150# to 2500#, API flanges
- Piping connection between straight lengths : 2D upstream and 2D downstream of the orifice plate
- Gasket types : flat gasket (spiral wound, graphite, PTFE) or RTJ (soft iron, inox, monel…)

GASKET FACES

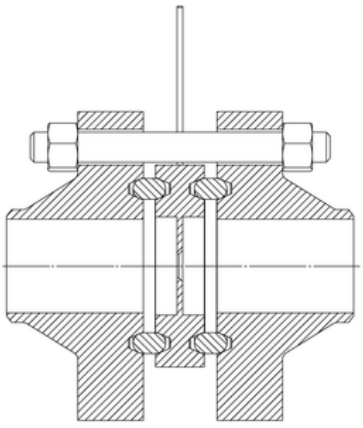
- gasket faces : RF face (Raised Face) - possibility of Stock Finish gasket seat
  RTJ male gasket
  RTJ female (3) gasket
  Large male / female face (4)
  Tongue / groove face (4)
- Mounting examples :



RF orifice plate
between flanges



RTJ-M orifice plate
between flanges



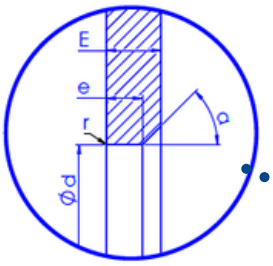
RTJ-F orifice plate (3)
between flanges

(3) RTJ female plates are thicker.

(4) Specify large or small male / female face if flanges according to ASME B16-5. standard.

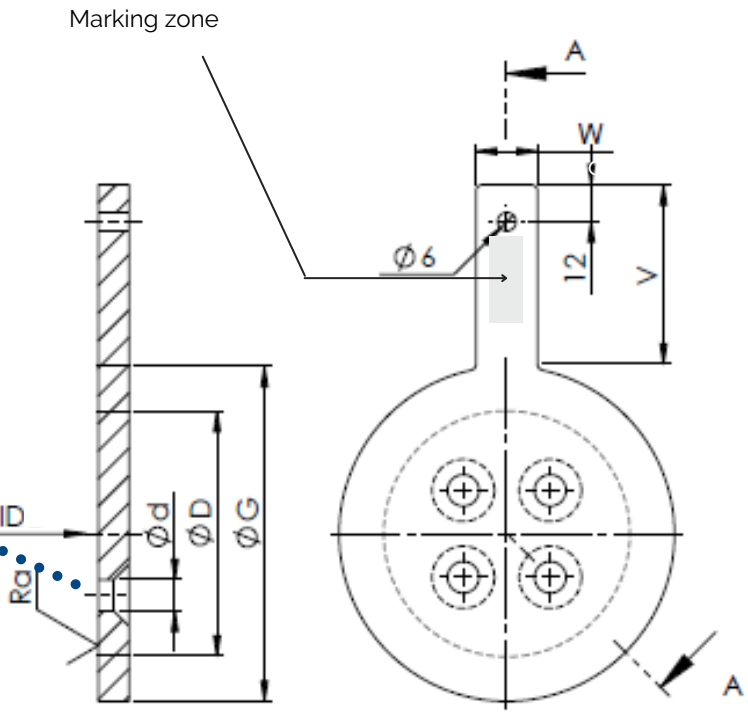
DIMENSIONS

RF conditioning orifice plate



Sharp edge detail

Ød, orifice diameter
r, sharp edge radius
e, orifice thickness
E, plate thickness
α, angle of the downstream bevel
ØD, inside pipe diameter
- see page 2 -



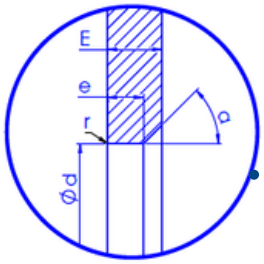
section A-A

RF orifice plate dimensional information (values in mm)

				Tab		ØG, orifice plate outside diameter in mm					
DN	DN	E	e	V	W	150# RF PN20 RF	300# RF PN50 RF	600# RF PN100 RF	900# RF PN150 RF	1500# RF PN250 RF	2500# RF PN420 RF
1"	25	3	0,4	100	20	65	71	71	77	77	84
1" 1/2	40	3	0,6	100	20	84	93	93	96	96	115
2"	50	3	0,8	100	20	103	109	109	141	141	144
2"1/2	65	3	1	100	20	122	128	128	163	163	166
3"	80	3	1,2	100	20	135	147	147	166	173	195
4"	100	3	1,5	150	25	173	179	192	204	208	233
6"	150	3	2	150	25	220	249	265	267	281	315
8"	200	6	3	150	25	277	306	319	357	350	385
10"	250	6	3	150	25	338	360	398	433	433	474
12"	300	6	3	150	25	408	420	455	496	519	547
14"	350	8	5	150	25	449	484	490	519	576	
18"	450	10	8	150	25	547	595	611	636	703	
20"	500	10	8	150	25	604	652	681	696	754	
24"	600	12	10	150	25	716	773	789	836	900	

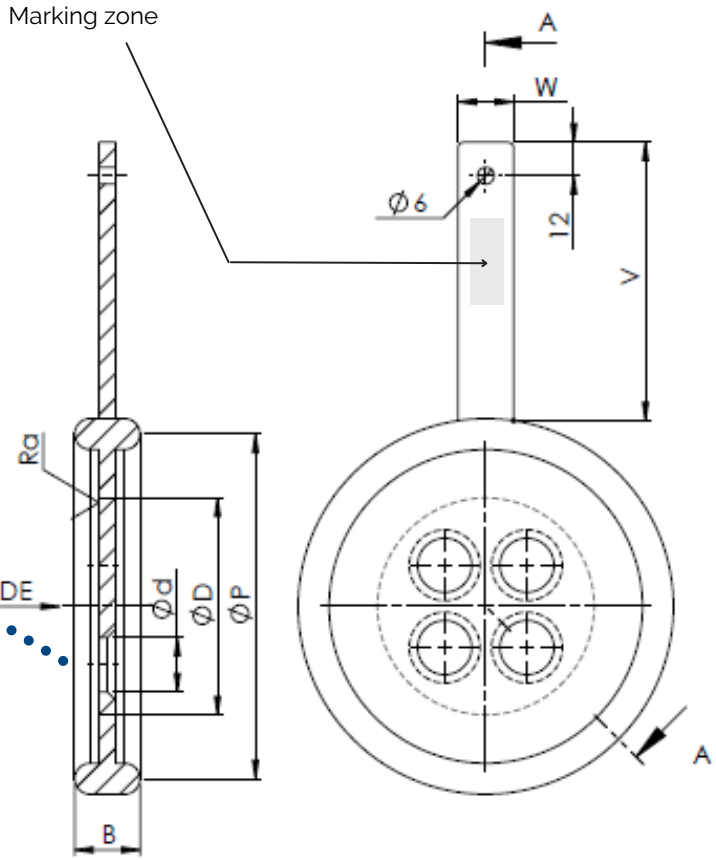
DIMENSIONS

RTJ-M conditionong orifice plate



Sharp edge detail

Ød, orifice diameter
r, sharp edge radius
e, orifice thickness
E, plate thickness
α, angle of the downstream bevel
ØD, inside pipe diameter
- see page 2 -



coupe A-A

RTJ-M orifice plate dimensional information (values in mm)

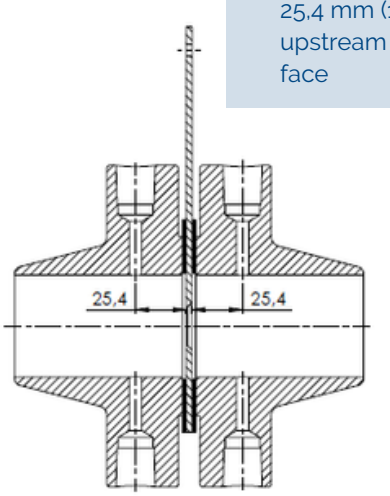
				Tab		Rating & PN - ring seal type R | B (mm) | ØP (mm)											
DN	DN	E	e	V	W	300# PN50		600# PN100	900# PN150			1500# PN250			2500# PN420		
1"	25	3	0,4	100	20	R16	25,4	50,8	R16	25,4	50,8	R16	25,4	50,8	R18	25,4	60,3
1" 1/2	40	3	0,6	100	20	R20	25,4	68,3	R20	25,4	68,3	R20	25,4	68,3	R23	27	82,5
2"	50	3	0,8	100	20	R23	27	82,5	R24	27	95,2	R24	27	95,2	R26	27	101,6
2"1/2	65	3	1	100	20	R26	27	101,6	R27	27	107,9	R27	27	107,9	R28	30,2	111,1
3"	80	3	1,2	100	20	R31	27	123,8	R31	27	123,8	R35	27	136,5	R32	30,2	127
4"	100	3	1,5	150	25	R37	27	149,2	R37	27	149,2	R39	27	161,9	R38	33,3	157,1
6"	150	3	2	150	25	R45	27	211,1	R45	27	211,1	R46	28,6	211,1	R47	36,5	228,6
8"	200	6	3	150	25	R49	27	269,9	R49	27	269,9	R50	33,3	269,9	R51	39,7	279,4
10"	250	6	3	150	25	R53	27	323,8	R53	27	323,8	R54	33,3	323,8	R55	47,6	342,9
12"	300	6	3	150	25	R57	27	381	R57	27	381	R58	39,7	381	R60	50,8	406,4
14"	350	8	5	150	25	R61	27	419,1	R62	33,3	419,1	R63	44,4	419,1			
18"	450	10	8	150	25	R69	30,2	533,4	R70	39,7	533,4	R71	50,8	533,4			
20"	500	10	8	150	25	R73	31,8	584,2	R74	39,7	584,2	R75	54	584,2			
24"	600	12	10	150	25	R77	36,5	692,1	R78	47,6	692,1	R79	58,7	692,1			

PRESSURE TAPS TYPES

For a conditioning orifice plate, the pressure taps have to be positioned and centered between 2 of the 4 orifices of the plate so that averaged upstream and downstream pressures are taken into account (5)

- flange tap (6) (or 1''/1'')
  with orifice flanges
  ASME standard only and from 300#

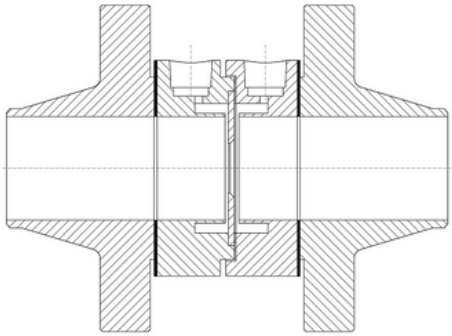
➤ The measurement is executed at 25,4 mm (1 inch) from the upstream and downstream plate face



- Easily interchangeable measuring element
- Plate / flange materials can be different

- corner tap (6) (or 0/0)
  with annular slots

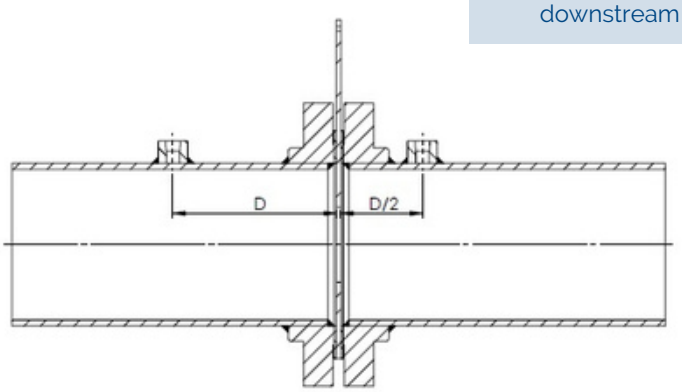
➤ The measurement is executed at the upstream and downstream plate edge



- Assembly used for better accuracy : averaged upstream and downstream pressure taps
- Mounting between simple flanges (welding neck, slip-on...)
- Flange / annular slots materials can be different

- D - D/2

➤ The measurement is executed respectively at D and D/2 from the upstream and downstream plate face



- Mounting of the orifice plate between simple flanges (welding neck, slip-on...)
- Assembly used for diameters > DN150
- Pressure taps welded to the pipe

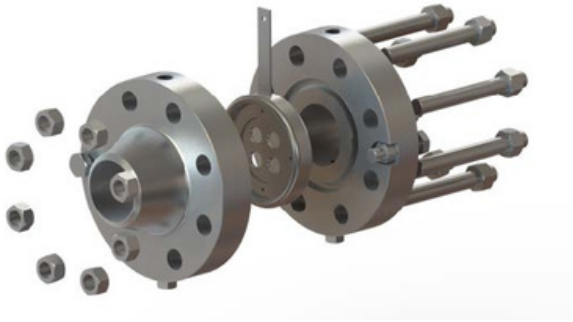
- illustrations with a RF orifice plate - the same types of pressure taps also exist in RTJ

(5) see recommendations on pressure taps orientation on page 7

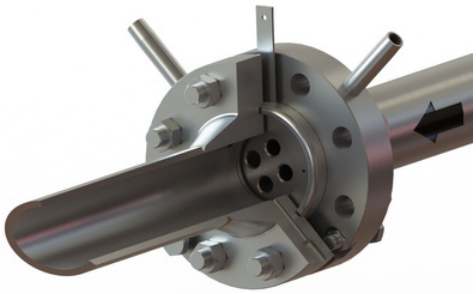
(6) for a flange tap (1"/1") or corner tap (0/0) monobloc version, see the corresponding datasheets

ASSEMBLY EXAMPLES

- RTJ-M conditioning orifice plate between Welding-Neck orifice flanges (1''/1'' pressure taps)



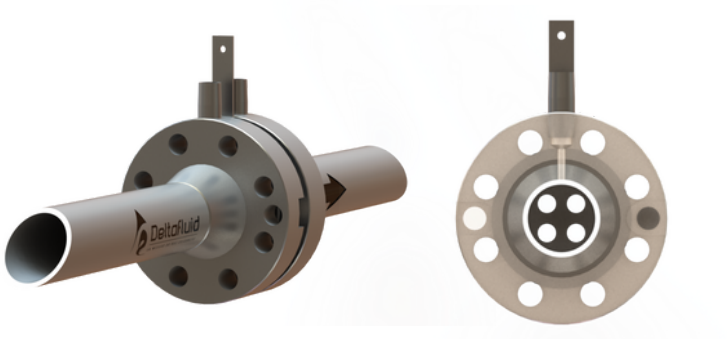
- RTJ-M conditioning orifice plate section with Welding-Neck orifice flanges – Mounting with upwards pressure taps (gas)



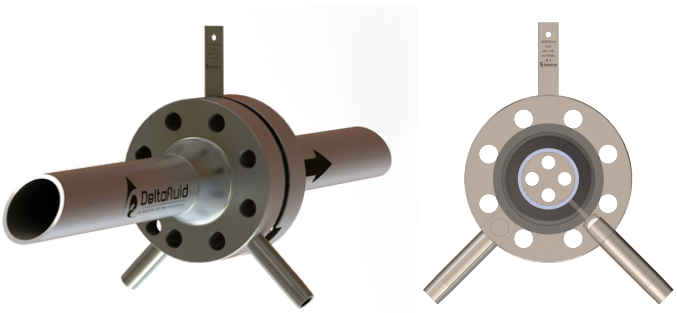
PRESSURE TAPS ORIENTATION

Reminder : the pressure taps have to be positioned and centered between 2 of the 4 orifices of the plate so that averaged upstream and downstream pressures are taken into account.

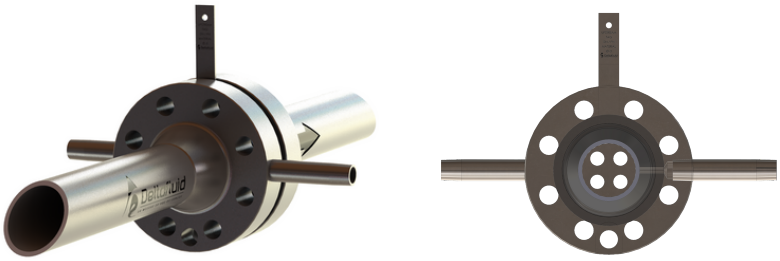
- Gas (7) : for a gas application, the pressure taps will preferably be oriented upwards



- Liquid (7): for a liquid application, the pressure taps will preferably be oriented downwards



- Steam (7) : for a steam application, the pressure taps will preferably be oriented horizontally

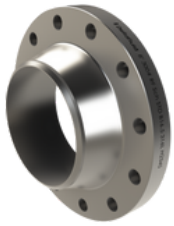


(7) For more details on pressure taps orientation for orifice plate assembly, see corresponding User Guides

ACCESSORIES

For flow measurement, we offer a full range of accessories for assembly with orifice plates.

- Flanges



Flanges with flat gasket face, raised face, large male/female face, tongue/groove face, RTJ-F face

For a complete assembly with orifice flanges, see flange tap flowmeter datasheet

- Gaskets & Boltings

Example of boltings with orifice flanges

- Transmitter

Differential pressure transmitter, multivariable transmitter

- Manifold

2-way / 3-way / 5-way manifold with or without direct mounting

- Condensation pot

- Valve

- Siphon

- Fittings

FURTHER INFORMATION

All information on the mounting of orifice plates (and their accessories) such as :

- pressure taps orientation
- mounting of the differential pressure transmitter
- flange tightening

can be found on the IOM notice "User guide - Installation, operation and maintenance manual".

ITEM CODES

- Conditioning orifice plate : DPLO4T-DN-PN-Face type-Material

DPLO4T	DN	PN	Face type	Material
Nominal diameter - ASME	1/2'' to 24''	150# to 2500#	RF RTJ SEM (5) SEF (5) DEM (5) DEF (5)	304L 316L Others
OR				
Nominal diameter - ISO	DN15 to 600	PN2,5 to 400		

- Examples conditioning orifice plate codes :

  - DPLO4T-2-300-RF-316
  - DPLO4T-DN100-PN64-RF-304
  - DPLO4T-12-900-RTJM-316

(5) Specify large or small male/female face if flanges according to ASME B16-5 standard.

Chemin Les Augas – RD817
64170 LACQ
FRANCE

delta64@deltafluid.fr

+33 (0)5 59 30 85 20

www.deltafluid.fr

DELTAFLUID