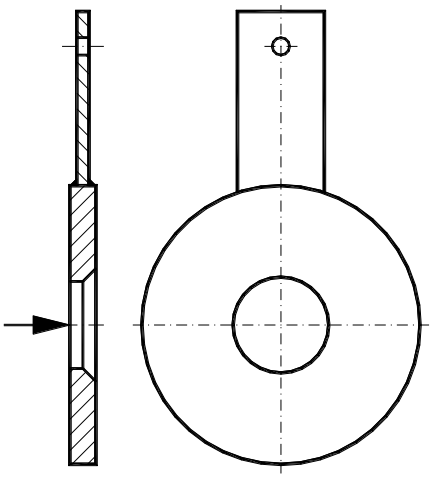
Orifice Plates BLS 100

Application

Orifice plates are flow elements used for flow measurement of single phase aggressive and non-aggressive gases, steam or



Design

Orifice plate with welded-on handle for direct installation between flanges or orifice flanges. Depending on the process conditions, the plate type may be manufactured as

- square edged concentric
- quarter circle nozzle
- segmental
- plate with conical entrance
- double cone

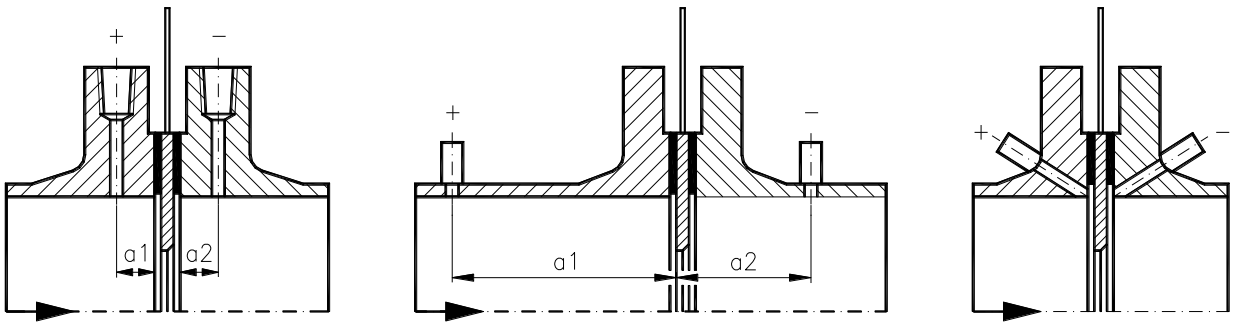
according to the relevant standards (ISO 5167, ASME MFC-3M, etc.). The plate type is chosen based on the specific process conditions. Orifice plates from a wear-resistant material like stainless steel.

Pressure Taps

The measurement standards differentiate between three types of pressure taps:

- flange tapping **(image 1)** where a1 = a2 = 25,4 mm
- pipe tapping D - D/2 **(image 2)** where a1 equals the pipe inner diameter D and a2 equals D/2
- corner tapping in the flange **(Bild 3)** which is based on standardized corner tapping

Special tappings (e.g. Vena Contracta) are also available and will be calculated respectively.



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Advantages

- low-price design, especially for large pipe diameters
- easy installation

Measuring Uncertainty

Ranges from 0,5% - 1,2% of the discharge coefficient C, depending on the application.

Pressure Loss

The pressure loss depends on the diameter ratio β (d/D) and ranges from 30 - 80% of the differential pressure.

Nominal Diameter (ISO 5167)

DN 50 to DN 1000 / 2“ to 40“ (if requested other sizes are possible)

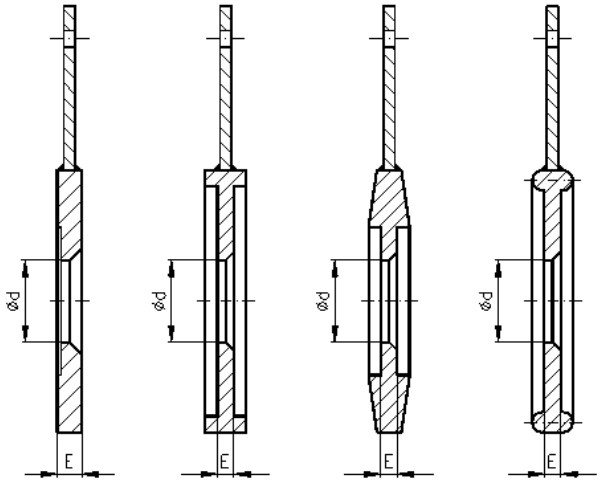
Pressure Rating

up to PN 400 / 2500# (ASME),

Plate Sealing Surface

according to EN 1092-1:

- flat (form B1 and B2)
- groove (form D)
- tongue (form C)
- female (form E)
- male (form E)



according to ASME B16.5:

- flat (RF and SF)
- groove (small/large)
- tongue (small/large)
- male/female (small/large)
- RTJ male or female

or according to other flange standards specified by the customer.

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Outer Diameter "d4"

The outer diameter of the plate is designed to fit between the respective flanges of the customer.

Bore Diameter "d"

The calculation of the bore diameter is based on the supplied process data. All relevant standards and regulations will be considered. The calculation is part of the scope of supply.

Marking

Tag no. of flow element
Pressure rating "PN"
Pipe inner diameter "D"
Bore diameter "d"
Material, direction of flow and tagging
of pressure tappings with "+" and "–"

Plate Thickness "E"

The plate thickness "E" as well as the dimensions of the tag handle depend on the nominal diameters and are based on DIN 19206 Parts 1-3 and the relevant ASME/API standards.

The following table for EN/DIN plates is taken off DIN 19206, whereas for ASME these are our standard plate thickness values.

DIN / EN

DN	up to 50	65	80	100	125	150	175	200	250	300	350	400	450	500	600	650*	700	750	800	850*	900	1000
mm	3	3	4	4	4	4	4	4	4	4	4	4	4	6	6	X	8	8	8	X	8	10

ASME

inch	up to 2"	2,5"	3"	4"	5"	6"	7"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"
mm	3	3	3	3	3	3	6	6	6	6	6	10	10	10	12	12	12	12	12	12	12	12	15	15

(*) = not in DIN Standard
plate thickness based on max. dp of 1000 mbar

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Special Designs of the Bore Hole

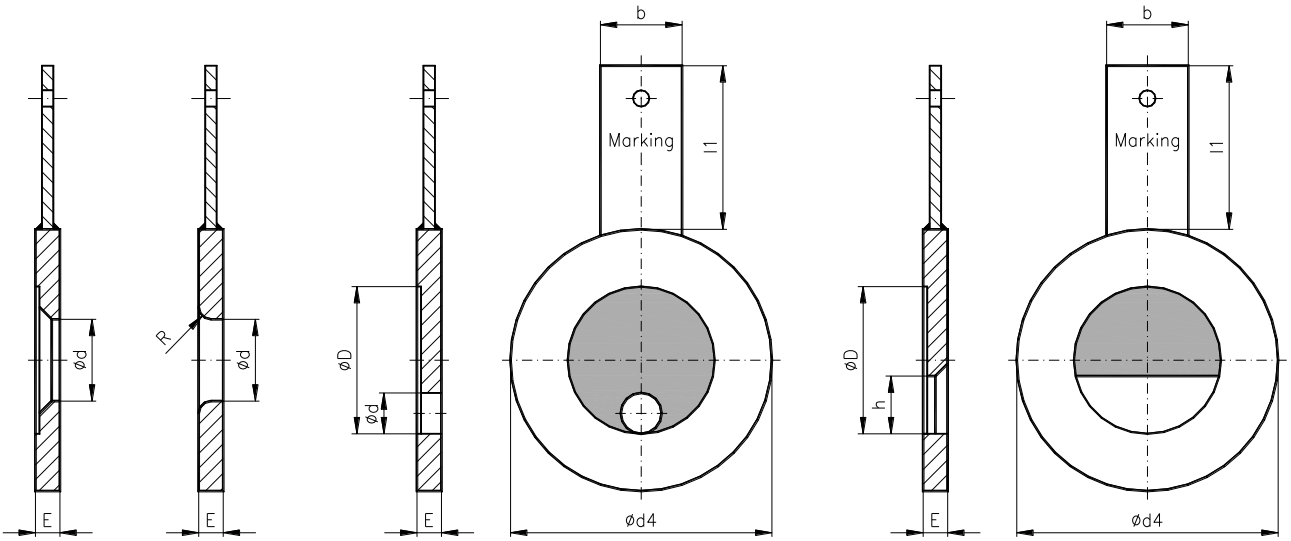
Cylindrical bore hole without downstream bevel (square edge both sides)
These are used for bi-directional flow measurement. The calculation is based on ISO 5167.

Conical entrance orifice plate (image 6)
These are used particularly for small Reynolds numbers starting at Re = 80.
Often they are needed for high viscosity fluids like oils etc. The calculation is based on ISO/TR 15377.

Quarter-circle orifice plate (image 7)
These are used particularly for small Reynolds numbers starting at Re = 500.
Typical applications are similar to conical entrance orifice plates. The calculation is based on VDI/VDE 2041 or ISO/TR 15377.

Eccentric orifice plate (image 8)
These are mostly used for liquids with entrained gases or liquids with solid particles. The calculation is based on ISO/TR 15377.

Segment orifice plate (image 9)
Typical applications are identical to those of eccentric orifice plates. However, they are easier to manufacture, especially for large pipe diameters. The calculation is based on VDI/VDE 2041.



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Materials

The following table shows a selection of typical materials utilized for orifice plates. When selecting the material, special consideration has to be taken for aggressive fluids. Other materials are also available on request.

Material	Description	DIN material no.	ASTM / UNS
plastics	Polyvinylcloride Polyethylen PVDF (GRP 25%) Teflon (GRP 25%)	PVC PE PVDF PTFE	Polyvinylcloride Polyethylene PVDF PTFE
non-alloy steels	S 235 JR (St37-2) P 265 GH (HII) -	1.0038 1.0425 -	- - A516 Gr. 60
stainless steels	X2CrNiMo17-12-2 X6CrNiTi 1810 X6CrNiMoTi 17 12 2 X2CrNiMoCu20-25	1.4404 1.4541 1.4571 1.4539	A240 Gr. 316L A240 Gr. 321 A240 Gr. 316Ti A240 Gr. 904L
seawater-resistant steels	Duplex Superduplex	1.4462 1.4501	S 31803 S 32760
heat resistant stainless steels	X10 CrAl 7 X15CrNiSi20-12	1.4713 1.4828	Sicromal 8 S 30900
high corrosion-resistant alloys	Hastelloy B2 Hastelloy C276 Titan Monel 400 Alloy 625	2.4617 2.4819 3.7035 2.4360 2.4856	N 10665 N 10276 R50250/R50400 N 04400 N 06625

Installation

Mounted between flanges according to EN 1092-1 / ASME B 16.5 or other standards such as DIN, JIS or BS. The pipe may be positioned horizontally, vertically or sloped.

Quality Control

Manufacture and Test work is done according to the relevant codes and standards such as AD 2000, EN 13480, ASME Codes (without stamp) or customer specifications.
Inspection certificates according to EN 10204 3.1 and 3.2 are furnished if ordered. Special inspections are available upon request.

Accessories

Orifice flanges or pipe flanges, screws and gaskets can be offered if requested.

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