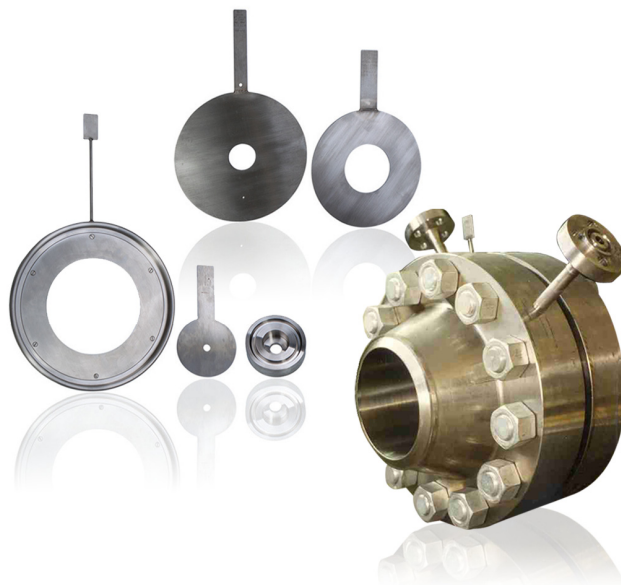


FPD150/160

Differential pressure – primary flow element orifice plates and orifice flange unions

Simple flow metering solutions for liquids, gases and steam, backed up by comprehensive documentation, certification and testing

Measurement made easy



Simple orifice plate for low-cost measurement

- installs direct between flanges

Engineered and manufactured to latest standards

- to ISO5167:2003 as standard
- other design standards available

Orifice flange Unions ready for direct welding into pipeline

- manufactured in accordance with ASME B16.36
- tappings accurately positioned
- complete with gaskets, nuts and bolts

Range of flange drillings / ratings available

- raised, flat or RTJ-profile

FPD150/160

Differential pressure – primary flow element orifice plates and orifice flange unions

Orifice plates

The differential pressure generated is sensed at a pair (or multiple pairs) of tapping points, each pair comprising a high pressure (inlet or upstream) and a low pressure (outlet or downstream) tapping. A variety of configurations are specified within ISO5167 and other standards, including the following:

D and D/2 taps

- the tappings are generally located in the pipe wall
- the upstream tapping is one pipe inside diameter (D) from the upstream face of the plate
- the downstream tapping is half the pipe inside diameter (D/2) from the downstream face of the plate

Flange taps

- the tappings are generally located in the pipe flanges
- the upstream tapping is 25.4 mm (1 in.) from the upstream face of the plate
- the downstream tapping is 25.4 mm (1 in.) from the downstream face of the plate

Corner taps

- the tappings are generally located in the pipe flanges
- the tappings break into the pipe at the corners formed by the upstream and downstream flange faces and the pipe wall

Orifice plate bore profiles

ABB offers a variety of orifice plate bore profiles to cover a wide range of applications. These bore profiles can be classified as follows:

- circular bore, concentric with the pipe
- circular bore, adjacent to the pipe wall
- segmental profile bore, adjacent to the pipe wall

ABB orifice plates are usually supplied with a data tab welded to the circumference. This tab can be engraved with orifice plate details (such as tag number and bore size) that are visible without removing the plate from the line.

Orifice plate types

Concentric square edge type plate

These plates are used to measure the flowrate of clean, low-viscosity liquids, gases and dry steam at Reynolds Numbers in the turbulent flow regime. The bore is sharp-edged on the inlet and usually parallel on the outlet, although, depending on the d/D ratio (Beta) and thickness, the outlet may be chamfered. The bore is calculated to produce the requested differential pressure at the design meter maximum flowrate and operating flowing conditions. Concentric orifice plates represent the majority of plates used across orifice-based devices and, as the name suggests, the orifice bore is positioned in the exact centre of the plate. The user must arrange for the provision of tapping points in the pipework in the necessary positions so that the generated differential pressure can be sensed and transmitted. They are used with corner, flange or D & D/2 taps.

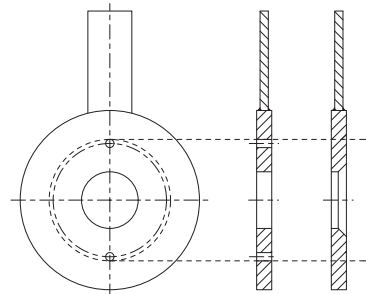


Fig. 1: Concentric square-edge type plate

Concentric conical entrance type plate

Conical Entrance plates have a bore with a chamfered (or conical) inlet section and a parallel throat / exit section. Their advantage is that they maintain their accuracy down to very low Reynolds Numbers and are therefore used to measure the flow of clean liquids at low velocity and / or at high viscosity. Additionally they are suited to the measurement of low-density gases.

Conical Entrance plates are used exclusively with corner taps.

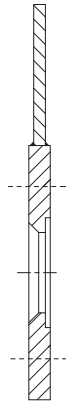


Fig. 2: Conical entrance type plate

Concentric quarter-circle type plate

Quarter-circle plates differ from conical entry plates by having a bore with an inlet in the form of a radius. They maintain their accuracy down to relatively low Reynolds Numbers (but not as low as those of conical entrance plates). Accordingly, they are used to measure the flow of clean liquids at low velocity and / or at elevated viscosity. They are also suited to the measurement of low-density gases.

Quarter-circle plates are used with either corner taps or flange taps.

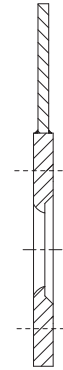


Fig. 3: Quarter circle type plate

Eccentric square edge type plate

A concentric orifice plate is unsuitable for dirty liquids and gases as the solids can build up in front of the plate causing a deterioration in accuracy and possible blockage. The bore of Eccentric plates is circular but is adjacent to the pipe wall so that solids can pass through freely. They are used to measure the flow of low-viscosity liquids carrying suspended solids (or entrained gas) or for gases carrying entrained liquid.

Eccentric plates are used with either corner taps or flange taps.

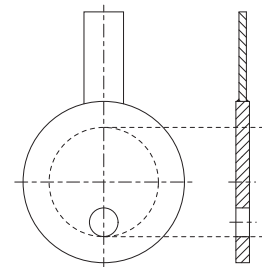


Fig. 4: Eccentric type plate

FPD150/160

Differential pressure – primary flow element orifice plates and orifice flange unions

Segmental square-edge type plate

The bore of segmental plates is in the shape of a segment of a circle with its curved edge adjacent to the pipe wall so that solids can pass through freely. It is used to measure the flow of either low-viscosity liquids carrying suspended solids (or entrained gas) or for gases carrying entrained liquid. However, the eccentric type is preferred for such applications.

Segmental plates are used with flange taps.

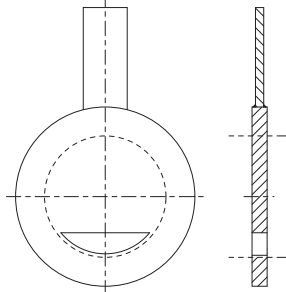


Fig. 5: Segmental type plate

Orifice flange unions

ABB orifice flange unions combine the orifice plate with a pair of flanges, complete with nuts, bolts, washers and gaskets. To enable separation of the two flanges for removal and installation of the orifice plate, the assembly is supplied with jacking bolts. The resultant assembly is typically butt-welded into the pipework, although the flanges can be supplied for socket weld or screwed installation into the pipework. The orifice plates are usually supplied with a data tab welded to the circumference. This tab can be engraved with plate information (such as tag number and bore size), that is visible without removing the plate from the line.

The differential pressure generated is sensed at a pair (or multiple pairs) of tapping points within the flange assembly, each pair comprising of a high pressure (inlet) and a low pressure (outlet) tapping.

As standard our orifice flange unions are supplied as welding-neck type. Other types, including socket weld and threaded, are available.



Fig. 6: Orifice flange union

Applications

Orifice plates are an incredibly versatile flow metering technology and can be used in a wide range of flow measurement applications, including:

- Clean liquids, gases and steam
- Fluids containing solids
- High viscosity fluids
- Fluids at low flowrates
- Flow monitoring
- Gas and utility flows to combustion plants
- Steam consumption
- Pilot plants

Comprehensive documentation

ABB offers unsurpassed quality in its DP devices and we also provide the full testing and documentation that your application needs. Whether the requirement is a single orifice plate with a simple certificate of conformity or a project requiring full material inspection, traceability, third-party verification and comprehensive data dossiers – the ABB facility at Workington satisfies all of the requirements.

Standards and services

These are just some of the standards we follow and the services we can provide:

Quality systems

BS EN ISO 9001:2000 Q 05907

Environmental impact

ISO 14001
EMS 40882

EU Pressure Equipment Directive

97/23/EC

Design

BS EN ISO 5167-1:2003
R W Miller
AGA
API
ASME

Materials and Traceability

BS EN 10204 3.1 B,C
NACE MR-01-75

Product testing services

Magnetic particle inspection
Dye-penetrant Inspection
PMI (Texas Nuclear)
Customer inspection
Independent third party Inspection

Base metal testing

Charpy impact testing
Hardness survey
HIC testing
Intercrystalline corrosion testing etc.

Certification / Documentation to your requirements

Bore calculations
PED 97/23/EC
Material certificates to BS EN 10204 3.1 B,C
NACE MR-01-75 conformity certificate
Welding qualifications to ASME IX, EN BS 288/287
GA drawings
Certificates of conformity
Weight certificates
NDT certificates and procedures
Quality plans
Full data dossiers
Installation and operating manuals etc.

FPD150/160

Differential pressure – primary flow element orifice plates and orifice flange unions

Specification

Materials

| | |
|---------------------------------|--|
| Plates: | Standard – 316/316L stainless steel |
| Flanges: | Standard – carbon steel; 316/316L stainless steel |
| Other flange & plate materials: | 304 St Stl ; 310 St Stl; 317/317L St Stl ; 321 St Stl; Low temp carbon steel (ASTM A350 LF2 Class 1); CrMo steel (ASTM A182 F11, F5 and F22); 22Cr duplex St Stl ; 25Cr super duplex St Stl; Alloy 400; Alloy 625; Alloy 800; Alloy 825; Alloy C276; Titanium; |
| Nuts: | ASTM A194 2H; ASTM A194 8MA |
| Bolts: | ASTM A193 B7; ASTM A193 B8M |
| Gaskets: | RF and FF flanges, RTJ flanges* – Asbestos free; spiral wound (SS windings with CS or SS outer ring) 22 % Cr duplex (UNS S31803); 25 % Cr super duplex St Steel (S32750, S32760); Soft iron; 316 / 316L stainless steel; 304 / 304L stainless steel S32750, S32760); 6 % Mo SS (UNS S31254); Alloy 400 (UNS N04400); Alloy 625 (UNS N06625); Alloy 800 (UNS N08800); Alloy 825 (UNS N08825) |

*For FPD150.P1 & FPD160.F1, the gasket material relates solely to the gasket.

For FPD150.P2 & FPD160.F2, the gasket material is the orifice plate holder material.

For FPD150.P3 & FPD160.F3, the plate and RTJ gasket are manufactured in a single piece and therefore the gasket must be specified to be the same material as the orifice plate.

Maximum working pressure

Limited by the application flange rating.

Maximum working temperature

Dependent on the material selection and application.

Pipeline size range (typical)

| | |
|-------------------|----------------------------|
| Concentric: | DN15 to 900 (½ to 36 in.) |
| Conical entrance: | DN15 to 500 (½ to 20 in.) |
| Quarter circle: | DN15 to 500 (½ to 20 in.) |
| Eccentric: | DN100 to 900 (4 to 36 in.) |
| Segmental: | DN25 to 600 (1 to 24 in.) |

Plate thickness

| | |
|-------------------|---|
| ABB Standard: | 3; 6; 10 mm |
| Others available: | 1.5; 2; 4; 8; 12; 15; 16 mm ½; ¾ in. |

The thickness of the orifice plate depends significantly on the application and design conditions.

Calculation standards

| | |
|------------|--|
| Preferred: | BS EN ISO 5167-1 & -2: 2003, unless otherwise requested |
| Others: | ASME; API; R W Miller; AGA |

Design standards

| | |
|---------|---------------------|
| Plate: | Preferred – ABB |
| Others: | Saudi Aramco; Shell |
| Flange: | ASME B16.36 |

Pressure losses

Typical pressure loss: 40 to 95% of the generated differential pressure, dependent on the Beta ratio (d/D) and plate design

Pipeline installation

Mounting: Butt weld, socket weld or screwed flanges
Facing: Raised face; flat face; RTJ (octagonal or oval profile)
Facing standards: ASME 150; 300; 400; 600; 900; 1500; 2500 lb.

Plates to fit between other flange standards can be supplied.

FPD150/160

Differential pressure – primary flow element orifice plates and orifice flange unions

Ordering information

FPD150 orifice plates

| Orifice plates | FPD150 | Main code | | | | | | | | | | Optional code | | | | | | | | | |
|--|--------|-----------|----|----|-----|----|----|----|-----|----|----|---------------|----|----|-----|----|-----|-----|--|--|--|
| | | XX | XX | XX | XXX | XX | XX | XX | XXX | XX | XX | XXX | XX | XX | XXX | XX | XXX | XXX | | | |
| Product design | | | | | | | | | | | | | | | | | | | | | |
| Orifice plate only (for RF/FF flanges) | P1 | | | | | | | | | | | | | | | | | | | | |
| Orifice plate screwed into RTJ male carrier | P2 | | | | | | | | | | | | | | | | | | | | |
| Orifice RTJ male plate (integral, one piece) | P3 | | | | | | | | | | | | | | | | | | | | |
| Customer-specific design | | | | | | | | | | | | | | | | | | | | | |
| ABB Standard | A1 | | | | | | | | | | | | | | | | | | | | |
| Aamco Standard | A2 | | | | | | | | | | | | | | | | | | | | |
| Shell Standard | S1 | | | | | | | | | | | | | | | | | | | | |
| Orifice design | | | | | | | | | | | | | | | | | | | | | |
| Concentric square edged – corner taps | C1 | | | | | | | | | | | | | | | | | | | | |
| Concentric square edged – flange taps | C2 | | | | | | | | | | | | | | | | | | | | |
| Concentric – D & D/2 taps | C3 | | | | | | | | | | | | | | | | | | | | |
| Conical entrance – corner taps | L1 | | | | | | | | | | | | | | | | | | | | |
| Eccentric – corner taps | E1 | | | | | | | | | | | | | | | | | | | | |
| Eccentric – flange taps 90° | E2 | | | | | | | | | | | | | | | | | | | | |
| Eccentric – flange taps 180° | E3 | | | | | | | | | | | | | | | | | | | | |
| Quarter circle – corner taps | U1 | | | | | | | | | | | | | | | | | | | | |
| Quarter circle – flange taps | U2 | | | | | | | | | | | | | | | | | | | | |
| Segmental – flange taps | S2 | | | | | | | | | | | | | | | | | | | | |
| Line nominal bore | | | | | | | | | | | | | | | | | | | | | |
| DN 15 (1/2 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 20 (3/4 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 25 (1 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 32 (1 1/4 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 40 (1 1/2 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 50 (2 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 65 (2 1/2 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 80 (3 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 90 (3 1/2 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 100 (4 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 125 (5 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 150 (6 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 200 (8 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 250 (10 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 300 (12 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 350 (14 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 400 (16 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 450 (18 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 500 (20 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 550 (22 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 600 (24 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 650 (26 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 700 (28 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 750 (30 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 800 (32 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 850 (34 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 900 (36 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 950 (38 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 1000 (40 in.) | | | | | | | | | | | | | | | | | | | | | |
| DN 1050 (42 in.) | | | | | | | | | | | | | | | | | | | | | |
| Others | | | | | | | | | | | | | | | | | | | | | |

See pages 11, 12 and 13

Continued on next page ...

| | Main code | | | | | | | | | | Optional code | | | | | | | |
|-----------------------------------|------------|----|----|----|-----|----|----|----|-----|----|-------------------------|-----|----|----|-----|----|-----|-----|
| | FPD150 | XX | XX | XX | XXX | XX | XX | XX | XXX | XX | XX | XXX | XX | XX | XXX | XX | XXX | XXX |
| Orifice plates | See page 8 | | | | | | | | | | See pages 11, 12 and 13 | | | | | | | |
| Pipe schedule | | | | | | | | | | | | | | | | | | |
| Schedule 5S | | | | | | | | | | | | | | | | | | |
| Schedule 5 | | | | | | | | | | | | | | | | | | |
| Schedule 10S | | | | | | | | | | | | | | | | | | |
| Schedule 10 | | | | | | | | | | | | | | | | | | |
| Schedule 20 | | | | | | | | | | | | | | | | | | |
| Schedule 30 | | | | | | | | | | | | | | | | | | |
| Schedule 40S | | | | | | | | | | | | | | | | | | |
| Schedule 40 | | | | | | | | | | | | | | | | | | |
| Schedule STD | | | | | | | | | | | | | | | | | | |
| Schedule 60 | | | | | | | | | | | | | | | | | | |
| Schedule 80S | | | | | | | | | | | | | | | | | | |
| Schedule 80 | | | | | | | | | | | | | | | | | | |
| Schedule XS | | | | | | | | | | | | | | | | | | |
| Schedule 100 | | | | | | | | | | | | | | | | | | |
| Schedule 120 | | | | | | | | | | | | | | | | | | |
| Schedule 140 | | | | | | | | | | | | | | | | | | |
| Schedule 160 | | | | | | | | | | | | | | | | | | |
| Schedule XXS | | | | | | | | | | | | | | | | | | |
| Others | | | | | | | | | | | | | | | | | | |
| Pipe material | | | | | | | | | | | | | | | | | | |
| 316 / 316L stainless steel | | | | | | | | | | | | | | | | | | |
| 304 / 304L stainless steel | | | | | | | | | | | | | | | | | | |
| 310 stainless steel | | | | | | | | | | | | | | | | | | |
| 321 stainless steel | | | | | | | | | | | | | | | | | | |
| 317 / 317L stainless steel | | | | | | | | | | | | | | | | | | |
| 22 % Cr duplex (UNS S31803) | | | | | | | | | | | | | | | | | | |
| 25 % Cr super duplex (UNS S32750) | | | | | | | | | | | | | | | | | | |
| 25 % Cr super duplex (UNS S32760) | | | | | | | | | | | | | | | | | | |
| 6 % Mo SS (UNS S31254) | | | | | | | | | | | | | | | | | | |
| Alloy 400 (UNS N04400) | | | | | | | | | | | | | | | | | | |
| Alloy 625 (UNS N06625) | | | | | | | | | | | | | | | | | | |
| Alloy 800 (UNS N08800) | | | | | | | | | | | | | | | | | | |
| Alloy 825 (UNS N08825) | | | | | | | | | | | | | | | | | | |
| Alloy C276 (UNS N10276) | | | | | | | | | | | | | | | | | | |
| Others | | | | | | | | | | | | | | | | | | |

Continued on next page ...

FPD150/160

Differential pressure – primary flow element orifice plates and orifice flange unions

| Main code | | | | | | | | | | Optional code | | | | | | | | | |
|---|----|----|----|-----|--------|----|----|-----|----|-------------------------|-----|-----|----|----|-----|----|-----|-----|-----|
| Orifice plates | | | | | | | | | | Orifice plates | | | | | | | | | |
| FPD150 | XX | XX | XX | XXX | XX | XX | XX | XXX | XX | XX | XXX | XXX | XX | XX | XXX | XX | XXX | XXX | XXX |
| See page 8 | | | | | page 9 | | | | | See pages 11, 12 and 13 | | | | | | | | | |
| Element material | | | | | | | | | | | | | | | | | | | |
| 316 / 316L stainless steel | | | | | | | | | | S6 | | | | | | | | | |
| 304 / 304L stainless steel | | | | | | | | | | S4 | | | | | | | | | |
| 310 stainless steel | | | | | | | | | | S3 | | | | | | | | | |
| 321 stainless steel | | | | | | | | | | S2 | | | | | | | | | |
| 317 / 317L stainless steel | | | | | | | | | | S8 | | | | | | | | | |
| 22% Cr duplex (UNS S31803) | | | | | | | | | | D1 | | | | | | | | | |
| 25% Cr super duplex (UNS S32750) | | | | | | | | | | D2 | | | | | | | | | |
| 25% Cr super duplex (UNS S32760) | | | | | | | | | | D3 | | | | | | | | | |
| 6% Mo SS (UNS S31254) | | | | | | | | | | M1 | | | | | | | | | |
| Alloy 400 (UNS N04400) | | | | | | | | | | M4 | | | | | | | | | |
| Alloy 625 (UNS N06625) | | | | | | | | | | N2 | | | | | | | | | |
| Alloy 800 (UNS N08800) | | | | | | | | | | U4 | | | | | | | | | |
| Alloy 825 (UNS N08825) | | | | | | | | | | U5 | | | | | | | | | |
| Alloy C276 (UNS N10276) | | | | | | | | | | U7 | | | | | | | | | |
| Others | | | | | | | | | | Z9 | | | | | | | | | |
| Orifice plate thickness | | | | | | | | | | | | | | | | | | | |
| 1.5 mm | | | | | | | | | | S01 | | | | | | | | | |
| 2 mm | | | | | | | | | | S02 | | | | | | | | | |
| 3 mm | | | | | | | | | | S03 | | | | | | | | | |
| 4 mm | | | | | | | | | | S04 | | | | | | | | | |
| 6 mm | | | | | | | | | | S05 | | | | | | | | | |
| 8 mm | | | | | | | | | | S06 | | | | | | | | | |
| 10 mm | | | | | | | | | | S07 | | | | | | | | | |
| 12 mm | | | | | | | | | | S08 | | | | | | | | | |
| 15 mm | | | | | | | | | | S09 | | | | | | | | | |
| 16 mm | | | | | | | | | | S10 | | | | | | | | | |
| Others | | | | | | | | | | Z99 | | | | | | | | | |
| Flange type | | | | | | | | | | | | | | | | | | | |
| Raised face flange | | | | | | | | | | R1 | | | | | | | | | |
| Oval RTJ | | | | | | | | | | J1 | | | | | | | | | |
| Octagonal RTJ | | | | | | | | | | J3 | | | | | | | | | |
| Flat face flange (within bolt circle) | | | | | | | | | | F1 | | | | | | | | | |
| Flat face flange (full face diameter plate with bolt holes) | | | | | | | | | | F2 | | | | | | | | | |
| Others | | | | | | | | | | Z9 | | | | | | | | | |

Continued on next page ...

| | Main code | | | | | | | | | | Optional code | | | | | | | | | | |
|-----------------------------------|-----------|------------|----|----|--------|----|-------------|----|-----|----|---------------|-----|-----|----|----|-----|----|-----|-----|-----|--|
| Orifice plates | FPD150 | XX | XX | XX | XXX | XX | XX | XX | XXX | XX | XX | XXX | XXX | XX | XX | XXX | XX | XXX | XXX | XXX | |
| | | See page 8 | | | page 9 | | See page 10 | | | | | | | | | | | | | | |
| Flange rating | | | | | | | | | | | | | | | | | | | | | |
| ASME Class 150 | | | | | | | | | | | A1 | | | | | | | | | | |
| ASME Class 300 | | | | | | | | | | | A3 | | | | | | | | | | |
| ASME Class 400 | | | | | | | | | | | A4 | | | | | | | | | | |
| ASME Class 600 | | | | | | | | | | | A6 | | | | | | | | | | |
| ASME Class 900 | | | | | | | | | | | A7 | | | | | | | | | | |
| ASME Class 1500 | | | | | | | | | | | A8 | | | | | | | | | | |
| ASME Class 2500 | | | | | | | | | | | A9 | | | | | | | | | | |
| DIN PN 6 | | | | | | | | | | | D0 | | | | | | | | | | |
| DIN PN 10 | | | | | | | | | | | D1 | | | | | | | | | | |
| DIN PN 16 | | | | | | | | | | | D2 | | | | | | | | | | |
| DIN PN 25 | | | | | | | | | | | D3 | | | | | | | | | | |
| DIN PN 40 | | | | | | | | | | | D4 | | | | | | | | | | |
| DIN PN 63 | | | | | | | | | | | D5 | | | | | | | | | | |
| DIN PN 100 | | | | | | | | | | | D6 | | | | | | | | | | |
| DIN PN 160 | | | | | | | | | | | D7 | | | | | | | | | | |
| Others | | | | | | | | | | | Z9 | | | | | | | | | | |
| Gasket material | | | | | | | | | | | | | | | | | | | | | |
| Soft iron | | | | | | | | | | | GP3 | | | | | | | | | | |
| 316 / 316L stainless steel | | | | | | | | | | | GS6 | | | | | | | | | | |
| 304 / 304L stainless steel | | | | | | | | | | | GS4 | | | | | | | | | | |
| 22 % Cr duplex (UNS S31803) | | | | | | | | | | | GD1 | | | | | | | | | | |
| 25 % Cr super duplex (UNS S32750) | | | | | | | | | | | GD2 | | | | | | | | | | |
| 25 % Cr super duplex (UNS S32760) | | | | | | | | | | | GD3 | | | | | | | | | | |
| 6 % Mo SS (UNS S31254) | | | | | | | | | | | GM1 | | | | | | | | | | |
| Alloy 20 (UNS N08020) | | | | | | | | | | | GU1 | | | | | | | | | | |
| Alloy 400 (UNS N04400) | | | | | | | | | | | GM4 | | | | | | | | | | |
| Alloy 600 (UNS N06600) | | | | | | | | | | | GU3 | | | | | | | | | | |
| Alloy 625 (UNS N06625) | | | | | | | | | | | GN2 | | | | | | | | | | |
| Alloy 800 (UNS N08800) | | | | | | | | | | | GU4 | | | | | | | | | | |
| Alloy 825 (UNS N08825) | | | | | | | | | | | GU5 | | | | | | | | | | |
| Alloy C276 (UNS N10276) | | | | | | | | | | | GU7 | | | | | | | | | | |
| Others | | | | | | | | | | | GZ9 | | | | | | | | | | |
| Orifice sealing face | | | | | | | | | | | | | | | | | | | | | |
| Scrolled (3.2 to 6.3 µm) | | | | | | | | | | | SF6 | | | | | | | | | | |
| Drain / Vent hole | | | | | | | | | | | | | | | | | | | | | |
| Drain hole (gas applications) | | | | | | | | | | | HT1 | | | | | | | | | | |
| Vent hole (liquid applications) | | | | | | | | | | | HT2 | | | | | | | | | | |

Continued on next page ...

FPD150/160

Differential pressure – primary flow element orifice plates and orifice flange unions

| Orifice plates | Main code | | | | | | | | | | Optional code | | | | | | | | |
|---|-----------|------------|----|----|-----|--------|----|-------------|-----|----|---------------|-----|----|----|-----|----|-----|-----|--|
| | FPD150 | XX | XX | XX | XXX | XX | XX | XX | XXX | XX | XXX | XXX | XX | XX | XXX | XX | XXX | XXX | |
| | | See page 8 | | | | page 9 | | See page 10 | | | | | | | | | | | |
| Drain / vent hole size | | | | | | | | | | | | | | | | | | | |
| 1 mm | | | | | | | | | | | HA1 | | | | | | | | |
| 1.5 mm | | | | | | | | | | | HA2 | | | | | | | | |
| 2 mm | | | | | | | | | | | HA3 | | | | | | | | |
| 3 mm | | | | | | | | | | | HA4 | | | | | | | | |
| 4 mm | | | | | | | | | | | HA5 | | | | | | | | |
| 5 mm | | | | | | | | | | | HA6 | | | | | | | | |
| 5.5 mm | | | | | | | | | | | HA7 | | | | | | | | |
| 6 mm | | | | | | | | | | | HA8 | | | | | | | | |
| 6.5 mm | | | | | | | | | | | HA9 | | | | | | | | |
| 7.5 mm | | | | | | | | | | | HB1 | | | | | | | | |
| 8 mm | | | | | | | | | | | HB2 | | | | | | | | |
| 10 mm | | | | | | | | | | | HB3 | | | | | | | | |
| 3/32 in. | | | | | | | | | | | HB4 | | | | | | | | |
| 1/8 in. | | | | | | | | | | | HB5 | | | | | | | | |
| 5/32 in. | | | | | | | | | | | HB6 | | | | | | | | |
| 3/16 in. | | | | | | | | | | | HB7 | | | | | | | | |
| 7/32 in. | | | | | | | | | | | HB8 | | | | | | | | |
| 1/4 in. | | | | | | | | | | | HB9 | | | | | | | | |
| 9/32 in. | | | | | | | | | | | HC1 | | | | | | | | |
| 5/16 in. | | | | | | | | | | | HC2 | | | | | | | | |
| 11/32 in. | | | | | | | | | | | HC3 | | | | | | | | |
| 3/8 in. | | | | | | | | | | | HC4 | | | | | | | | |
| 13/32 in. | | | | | | | | | | | HC5 | | | | | | | | |
| 7/16 in. | | | | | | | | | | | HC6 | | | | | | | | |
| 15/32 in. | | | | | | | | | | | HC7 | | | | | | | | |
| 1/2 in. | | | | | | | | | | | HC8 | | | | | | | | |
| Others | | | | | | | | | | | HZ9 | | | | | | | | |
| Surface Treatment | | | | | | | | | | | | | | | | | | | |
| Oxygen cleaning | | | | | | | | | | | P1 | | | | | | | | |
| Others | | | | | | | | | | | Z9 | | | | | | | | |
| Certification | | | | | | | | | | | | | | | | | | | |
| Material certificates to BS EN 10204 3.1 B | | | | | | | | | | | C2 | | | | | | | | |
| Material certificates to BS EN 10204 3.1 C | | | | | | | | | | | C3 | | | | | | | | |
| Material NACE MR0175 | | | | | | | | | | | CN | | | | | | | | |
| Material NACE MR0103 | | | | | | | | | | | CM | | | | | | | | |
| Positive material identification (NITRON XRF) | | | | | | | | | | | CA | | | | | | | | |
| 100% dimensional check | | | | | | | | | | | C6 | | | | | | | | |
| Others | | | | | | | | | | | Z9 | | | | | | | | |

Continued on next page ...

| Orifice plates | Main code | | | | | | | | | | Optional code | | | | | | | | | |
|---|-----------|------------|----|----|-----|--------|----|-------------|-----|----|---------------|-----|-----|----|----|----|-----|----|-----|-----|
| | FPD150 | XX | XX | XX | XXX | XX | XX | XX | XXX | XX | XX | XXX | XXX | XX | XX | XX | XXX | XX | XXX | XXX |
| | | See page 8 | | | | page 9 | | See page 10 | | | | | | | | | | | | |
| Testing | | | | | | | | | | | | | | | | | | | | |
| Impact testing @ -46 °C (-50.8 °F) | | | | | | | | | | | | | | | | | | | | CH1 |
| Impact testing @ -196 °C (-320.8 °F) | | | | | | | | | | | | | | | | | | | | CH2 |
| Hardness survey | | | | | | | | | | | | | | | | | | | | CH3 |
| Documentation language (default = English) | | | | | | | | | | | | | | | | | | | | |
| German | | | | | | | | | | | | | | | | | | | | M1 |
| Italian | | | | | | | | | | | | | | | | | | | | M2 |
| Spanish | | | | | | | | | | | | | | | | | | | | M3 |
| French | | | | | | | | | | | | | | | | | | | | M4 |
| Chinese | | | | | | | | | | | | | | | | | | | | M6 |
| Added requirements | | | | | | | | | | | | | | | | | | | | |
| Manufactured to customer drawing | | | | | | | | | | | | | | | | | | | | GD9 |
| Special device | | | | | | | | | | | | | | | | | | | | STZ |
| Material source limitations apply | | | | | | | | | | | | | | | | | | | | MS1 |
| Others | | | | | | | | | | | | | | | | | | | | MZ9 |
| Tab handle | | | | | | | | | | | | | | | | | | | | |
| No tab handle | | | | | | | | | | | | | | | | | | | | TH0 |

FPD150/160

Differential pressure – primary flow element orifice plates and orifice flange unions

FPD160 orifice flange unions

| | | Main code | | | | | | | | | | | | Options | | | | | | | | | | | | |
|---|--|-----------|----|----|----|----|----|----|----|-----|----|----|----|---------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|-----|
| Orifice flange unions | | FPD160 | XX | XX | XX | XX | XX | XX | XX | XXX | XX | XX | XX | XXX | XXX | XX | XXX | XX | XXX | XXX | XXX | XX | XXX | XX | XXX | XXX |
| Product design | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Orifice plate only (RF/FF flanges) | | | F1 | | | | | | | | | | | | | | | | | | | | | | | |
| Orifice screwed carrier flange assembly (RTJ male) | | | F2 | | | | | | | | | | | | | | | | | | | | | | | |
| Orifice integral carrier flange assembly (RTJ male) | | | F3 | | | | | | | | | | | | | | | | | | | | | | | |
| Customer-specific design | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ABB Standard | | | A1 | | | | | | | | | | | | | | | | | | | | | | | |
| Aamco Standard | | | A2 | | | | | | | | | | | | | | | | | | | | | | | |
| Shell Standard | | | S1 | | | | | | | | | | | | | | | | | | | | | | | |
| Orifice design | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Concentric square edged – corner taps | | | C1 | | | | | | | | | | | | | | | | | | | | | | | |
| Concentric square edged – flange taps | | | C2 | | | | | | | | | | | | | | | | | | | | | | | |
| Conical entrance – corner taps | | | L1 | | | | | | | | | | | | | | | | | | | | | | | |
| Eccentric – corner taps | | | E1 | | | | | | | | | | | | | | | | | | | | | | | |
| Eccentric – flange taps 90° | | | E2 | | | | | | | | | | | | | | | | | | | | | | | |
| Eccentric – flange taps 180° | | | E3 | | | | | | | | | | | | | | | | | | | | | | | |
| Quarter circle – corner taps | | | U1 | | | | | | | | | | | | | | | | | | | | | | | |
| Quarter circle – flange taps | | | U2 | | | | | | | | | | | | | | | | | | | | | | | |
| Segmental – flange taps | | | S2 | | | | | | | | | | | | | | | | | | | | | | | |
| Line nominal bore | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 15 (1/2 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 20 (3/4 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 25 (1 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 32 (1 1/4 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 40 (1 1/2 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 50 (2 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 65 (2 1/2 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 80 (3 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 90 (3 1/2 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 100 (4 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 125 (5 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 150 (6 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 200 (8 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 250 (10 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 300 (12 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 350 (14 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 400 (16 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 450 (18 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 500 (20 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 550 (22 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 600 (24 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 650 (26 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 700 (28 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 750 (30 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 800 (32 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 850 (34 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DN 900 (36 in.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other | | | | | | | | | | | | | | | | | | | | | | | | | | |

See pages 17 and 18

Main code – continued on next page ...

| | | Main code | | | | | | | | | | | | Options | | | | | | | | | | | | | | |
|--|--------|-------------|----|----|----|----|----|----|-----|----|----|----|-----|---------------------|----|-----|----|----|-----|----|-----|-----|----|-----|----|-----|-----|--|
| Orifice flange unions | FPD160 | XX | XX | XX | XX | XX | XX | XX | XXX | XX | XX | XX | XXX | XXX | XX | XXX | XX | XX | XXX | XX | XXX | XXX | XX | XXX | XX | XXX | XXX | |
| | | See page 14 | | | | | | | | | | | | See pages 17 and 18 | | | | | | | | | | | | | | |
| Pipe schedule | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 5S | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 10S | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 40S | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule STD | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 80S | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule XS | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 120 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 140 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule 160 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schedule XXS | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flange material | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 316 / 316L stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 304 / 304L stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Carbon Steel (A105N/A106 Gr.B) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Low temperature carbon steel (A350 LF2 C1/A333 Gr 6) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 310 stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 321 stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 317 / 317L stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 % Cr duplex (UNS S31803) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25% Cr super duplex (UNS S32750/S32760) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 % Mo SS (UNS S31254) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alloy 400 (UNS N04400) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alloy 625 (UNS N06625) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alloy 800 (UNS N08800) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alloy 825 (UNS N08825) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alloy C276 (UNS N10276) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 Cr-1/2 Mo low alloy F5 (UNS K41545) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 1/4 Cr-1/2 Mo low alloy F11 (UNS K11597) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 1/4 Cr-1 Mo low alloy F22 (UNS K21590) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Element material | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 316 / 316L stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 304 / 304L stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 310 stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 321 stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 317 / 317L stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22% Cr duplex (UNS S31803) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25% Cr super duplex (UNS S32750) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25% Cr super duplex (UNS S32760) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6% Mo SS (UNS S31254) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alloy 400 (UNS N04400) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alloy 625 (UNS N06625) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alloy 800 (UNS N08800) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alloy 825 (UNS N08825) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alloy C276 (UNS N10276) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Main code – continued on next page ...

FPD150/160

Differential pressure – primary flow element orifice plates and orifice flange unions

| | | Main code | | | | | | | | | | | | Options | | | | | | | | | | | | | | | | | | | |
|--|--------|-------------|----|----|----|----|----|-------------|-----|----|----|----|-----|---------------------|----|-----|----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|
| Orifice flange unions | FPD160 | XX | XX | XX | XX | XX | XX | XX | XXX | XX | XX | XX | XXX | XXX | XX | XXX | XX | XX | XXX | XX | XXX | XX | XXX | XX | XXX | XX | XXX | XX | XXX | XX | XXX | | |
| | | See page 14 | | | | | | See page 15 | | | | | | See pages 17 and 18 | | | | | | | | | | | | | | | | | | | |
| Orifice plate thickness | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.5 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | S01 | |
| 2 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | S02 | |
| 3 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | S03 | |
| 4 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | S04 | |
| 6 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | S05 | |
| 8 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | S06 | |
| 10 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | S07 | |
| 12 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | S08 | |
| 1/2 in. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | T01 | |
| 15 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | T03 | |
| 16 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | S09 | |
| 3/4 in. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | T02 | |
| Others | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Z99 | |
| Flange type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Raised face flange | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | R1 | |
| Oval RTJ flange | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | J1 | |
| Octagonal RTJ flange | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | J3 | |
| Flat face flange | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | F1 | |
| Flat face flange – full face plate with bolt holes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | F2 | |
| Others | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Z9 | |
| Flange rating | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ASME Class 300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | A3 | |
| ASME Class 400 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | A4 | |
| ASME Class 600 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | A6 | |
| ASME Class 900 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | A7 | |
| ASME Class 1500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | A8 | |
| ASME Class 2500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | A9 | |
| Others | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Z9 | |
| Body type and material | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ASTM A193 B7 / ASTM A194 2H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | BGC | |
| ASTM A193 B8M / ASTM A194 8MA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | BGS |
| Gasket Material | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Asbestos-free 1.6 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GT1 | |
| Spiral wound – SS windings with CS outer; 4.5 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GT2 | |
| Soft iron | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GP3 |
| 316 / 316L stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GS6 |
| 304 / 304L stainless steel | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GS4 |
| 22 % Cr duplex (UNS S31803) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GD1 |
| 25 % Cr super duplex (UNS S32750) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GD2 |
| 25 % Cr super duplex (UNS S32760) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GD3 |
| 6 % Mo SS (UNS S31254) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GM1 |
| Alloy 400 (UNS N04400) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GM4 |
| Alloy 625 (UNS N06625) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GN2 |
| Alloy 800 (UNS N08800) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GU4 |
| Alloy 825 (UNS N08825) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GU5 |
| Others | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | GZ9 |

Optional codes continued on next page ...

| | Main code | | | | | | | | | | | | | Options | | | | | | | | | | | | | |
|---------------------------------|-----------|-------------|----|----|-------------|----|----|-------------|-----|----|----|----|-----|---------|----|-----|----|----|-----|----|-----|----|-----|----|-----|-----|--|
| Orifice flange unions | FPD160 | XX | XX | XX | XX | XX | XX | XX | XXX | XX | XX | XX | XXX | XXX | XX | XXX | XX | XX | XXX | XX | XXX | XX | XXX | XX | XXX | XXX | |
| | | See page 14 | | | See page 15 | | | See page 16 | | | | | | | | | | | | | | | | | | | |
| Orifice sealing face | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Scrolled (3.2 to 6.3 µm) | | | | | | | | | | | | | | SF6 | | | | | | | | | | | | | |
| Drain / Vent hole | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drain hole (gas applications) | | | | | | | | | | | | | | HT1 | | | | | | | | | | | | | |
| Vent hole (liquid applications) | | | | | | | | | | | | | | HT2 | | | | | | | | | | | | | |
| Drain / Vent hole size | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 mm | | | | | | | | | | | | | | HA1 | | | | | | | | | | | | | |
| 1.5 mm | | | | | | | | | | | | | | HA2 | | | | | | | | | | | | | |
| 2 mm | | | | | | | | | | | | | | HA3 | | | | | | | | | | | | | |
| 3 mm | | | | | | | | | | | | | | HA4 | | | | | | | | | | | | | |
| 4 mm | | | | | | | | | | | | | | HA5 | | | | | | | | | | | | | |
| 5 mm | | | | | | | | | | | | | | HA6 | | | | | | | | | | | | | |
| 5.5 mm | | | | | | | | | | | | | | HA7 | | | | | | | | | | | | | |
| 6 mm | | | | | | | | | | | | | | HA8 | | | | | | | | | | | | | |
| 6.5 mm | | | | | | | | | | | | | | HA9 | | | | | | | | | | | | | |
| 7.5 mm | | | | | | | | | | | | | | HB1 | | | | | | | | | | | | | |
| 8 mm | | | | | | | | | | | | | | HB2 | | | | | | | | | | | | | |
| 10 mm | | | | | | | | | | | | | | HB3 | | | | | | | | | | | | | |
| 3/32 in. | | | | | | | | | | | | | | HB4 | | | | | | | | | | | | | |
| 1/8 in. | | | | | | | | | | | | | | HB5 | | | | | | | | | | | | | |
| 5/32 in. | | | | | | | | | | | | | | HB6 | | | | | | | | | | | | | |
| 3/16 in. | | | | | | | | | | | | | | HB7 | | | | | | | | | | | | | |
| 7/32 in. | | | | | | | | | | | | | | HB8 | | | | | | | | | | | | | |
| 1/4 in. | | | | | | | | | | | | | | HB9 | | | | | | | | | | | | | |
| 9/32 in. | | | | | | | | | | | | | | HC1 | | | | | | | | | | | | | |
| 5/16 in. | | | | | | | | | | | | | | HC2 | | | | | | | | | | | | | |
| 11/32 in. | | | | | | | | | | | | | | HC3 | | | | | | | | | | | | | |
| 3/8 in. | | | | | | | | | | | | | | HC4 | | | | | | | | | | | | | |
| 13/32 in. | | | | | | | | | | | | | | HC5 | | | | | | | | | | | | | |
| 7/16 in. | | | | | | | | | | | | | | HC6 | | | | | | | | | | | | | |
| 15/32 in. | | | | | | | | | | | | | | HC7 | | | | | | | | | | | | | |
| 1/2 in. | | | | | | | | | | | | | | HC8 | | | | | | | | | | | | | |
| Others | | | | | | | | | | | | | | HZ9 | | | | | | | | | | | | | |
| Surface treatment | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oxygen cleaning | | | | | | | | | | | | | | P1 | | | | | | | | | | | | | |
| Others | | | | | | | | | | | | | | Z9 | | | | | | | | | | | | | |
| Tapping type | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Threaded (female) | | | | | | | | | | | | | | CTT | | | | | | | | | | | | | |
| Nipolet | | | | | | | | | | | | | | TT2 | | | | | | | | | | | | | |
| Nipoflange (B16.5) | | | | | | | | | | | | | | TT3 | | | | | | | | | | | | | |
| Socket weld | | | | | | | | | | | | | | TT4 | | | | | | | | | | | | | |
| Thread (male) nipple | | | | | | | | | | | | | | TT5 | | | | | | | | | | | | | |
| Others | | | | | | | | | | | | | | TZ9 | | | | | | | | | | | | | |

Optional codes continued on next page ...

FPD150/160

Differential pressure – primary flow element orifice plates and orifice flange unions

| Orifice flange unions | Main code | | | | | | | | | | | | Options | | | | | | | | | | | | |
|---|-----------|-------------|----|----|----|-------------|----|----|----|-------------|----|----|---------|-------------|----|----|----|----|-----|-----|--|--|--|--|--|
| | FPD160 | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | | | | | |
| | | See page 14 | | | | See page 15 | | | | See page 16 | | | | See page 17 | | | | | | | | | | | |
| Tapping rating | | | | | | | | | | | | | | | | | | | | | | | | | |
| BSP Tr (M) | | | | | | | | | | | | | | | | | | | TRB | | | | | | |
| NPT F | | | | | | | | | | | | | | | | | | | TRC | | | | | | |
| NPT M | | | | | | | | | | | | | | | | | | | TRD | | | | | | |
| As line rating | | | | | | | | | | | | | | | | | | | TRE | | | | | | |
| ASME Class 150 RF | | | | | | | | | | | | | | | | | | | TR1 | | | | | | |
| ASME Class 300 RF | | | | | | | | | | | | | | | | | | | TR2 | | | | | | |
| ASME Class 600 RF | | | | | | | | | | | | | | | | | | | TR3 | | | | | | |
| ASME Class 900 RF | | | | | | | | | | | | | | | | | | | TRV | | | | | | |
| ASME Class 1500 RF | | | | | | | | | | | | | | | | | | | TRW | | | | | | |
| ASME Class 2500 RF | | | | | | | | | | | | | | | | | | | TRX | | | | | | |
| ASME Class 150 RTJ | | | | | | | | | | | | | | | | | | | TRY | | | | | | |
| ASME Class 300 RTJ | | | | | | | | | | | | | | | | | | | TRZ | | | | | | |
| ASME Class 600 RTJ | | | | | | | | | | | | | | | | | | | TR6 | | | | | | |
| ASME Class 900 RTJ | | | | | | | | | | | | | | | | | | | TR7 | | | | | | |
| ASME Class 1500 RTJ | | | | | | | | | | | | | | | | | | | TR8 | | | | | | |
| ASME Class 2500 RTJ | | | | | | | | | | | | | | | | | | | TR9 | | | | | | |
| Kidney Flange | | | | | | | | | | | | | | | | | | | TRK | | | | | | |
| Tapping size | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1/2 in. | | | | | | | | | | | | | | | | | | | TS2 | | | | | | |
| 3/4 in. | | | | | | | | | | | | | | | | | | | TS3 | | | | | | |
| Others | | | | | | | | | | | | | | | | | | | TZ9 | | | | | | |
| Tapping sets | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Set | | | | | | | | | | | | | | | | | | | TN1 | | | | | | |
| 2 Sets | | | | | | | | | | | | | | | | | | | TN2 | | | | | | |
| 3 Sets | | | | | | | | | | | | | | | | | | | TN3 | | | | | | |
| 4 Sets | | | | | | | | | | | | | | | | | | | TN4 | | | | | | |
| Tapping orientation | | | | | | | | | | | | | | | | | | | | | | | | | |
| Inclined up | | | | | | | | | | | | | | | | | | | TG2 | | | | | | |
| Horizontal | | | | | | | | | | | | | | | | | | | TG3 | | | | | | |
| Inclined down | | | | | | | | | | | | | | | | | | | TG4 | | | | | | |
| Certification | | | | | | | | | | | | | | | | | | | | | | | | | |
| Material certificates EN 10204 3.1 | | | | | | | | | | | | | | | | | | | | C2 | | | | | |
| Material certificates EN 10204 3.2 | | | | | | | | | | | | | | | | | | | | C3 | | | | | |
| Material NACE MR0175 | | | | | | | | | | | | | | | | | | | | CN | | | | | |
| Material NACE MR0103 | | | | | | | | | | | | | | | | | | | | CM | | | | | |
| Positive material identification (NITRON XRF) | | | | | | | | | | | | | | | | | | | | CA | | | | | |
| 100% dimensional check | | | | | | | | | | | | | | | | | | | | C6 | | | | | |
| Others | | | | | | | | | | | | | | | | | | | | Z9 | | | | | |
| Testing | | | | | | | | | | | | | | | | | | | | | | | | | |
| Impact testing @ -46 °C | | | | | | | | | | | | | | | | | | | | CH1 | | | | | |
| Impact testing @ -196 °C | | | | | | | | | | | | | | | | | | | | CH2 | | | | | |
| Hardness survey | | | | | | | | | | | | | | | | | | | | CH3 | | | | | |
| Others | | | | | | | | | | | | | | | | | | | | CZ9 | | | | | |
| Documentation language (default = English) | | | | | | | | | | | | | | | | | | | | | | | | | |
| German | | | | | | | | | | | | | | | | | | | | M1 | | | | | |
| Italian | | | | | | | | | | | | | | | | | | | | M2 | | | | | |
| Spanish | | | | | | | | | | | | | | | | | | | | M3 | | | | | |
| French | | | | | | | | | | | | | | | | | | | | M4 | | | | | |
| Chinese | | | | | | | | | | | | | | | | | | | | M6 | | | | | |
| Added requirements | | | | | | | | | | | | | | | | | | | | | | | | | |
| Manufactured to customer drawing | | | | | | | | | | | | | | | | | | | | GD9 | | | | | |
| Special device | | | | | | | | | | | | | | | | | | | | STZ | | | | | |
| Material source limitations apply | | | | | | | | | | | | | | | | | | | | MS1 | | | | | |
| Others | | | | | | | | | | | | | | | | | | | | MZ9 | | | | | |
| Tab handle | | | | | | | | | | | | | | | | | | | | | | | | | |
| No tab handle | | | | | | | | | | | | | | | | | | | | | | | | | |

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FPD150



FPD160



Service