

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.

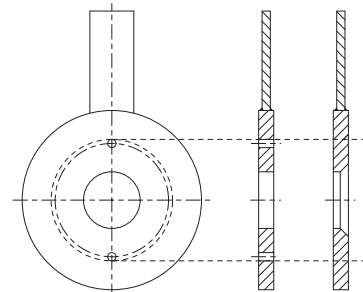


Fig. 1: Concentric square-edge type plate

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.

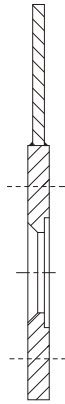


Fig. 2: Conical entrance type plate

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.

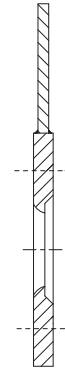


Fig. 3: Quarter circle type plate

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.

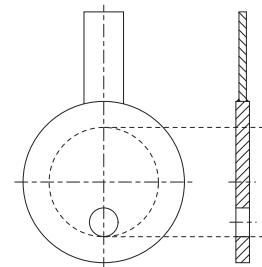


Fig. 4: Eccentric type plate

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.

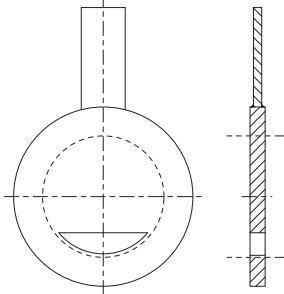


Fig. 5: Segmental type plate

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									
Orifice plates	FPD150	XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XXX	XX	XX	XXX	XX	XXX	XXX	XXX	
	See page 8																			
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	XXX	XX	XX	XXX	XX	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	XX	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	XXX	XX	XX	XX	XXX	XXX	XX	XXX	XX	XX	XXX	XX	XXX	XXX	XX	XXX	XX	XXX	XXX		
		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																													

Notes

Contact us

ABB Limited

Process Automation

Salterbeck Trading Estate

Workington

Cumbria CA14 5DS

UK

Tel: +44 (0)1946 830 611

Fax: +44 (0)1946 832 661

ABB Inc.

Process Automation

125 E. County Line Road

Warminster

PA 18974

USA

Tel: +1 215 674 6000

Fax: +1 215 674 7183

www.abb.com

Note

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents in whole or in parts – is forbidden without prior written consent of ABB.

Copyright© 2015 ABB

All rights reserved



FPD150



FPD160



Service