

FPD190

Differential pressure – restriction orifice plates

Limits the flowrate or reduces the pressure of liquids, gases and steam

Better Measurement
Better Outcomes



Orifice plate for flow restriction or pressure drop

- installs direct between flanges
- available as single concentric plate, single multi-hole plate or a multi-stage assembly

Engineered and manufactured to latest standards

- to R W Miller as standard
- noise calculations to IEC 60534-8-3; IEC 60534-8-4

Range of flange drillings / ratings available

- raised, flat or RTJ-profile

Restriction orifice plates

The overall pressure loss generated by the plate is calculated at a pair of theoretical tapping points. The high pressure (inlet or upstream) tapping is considered to be located 2.5 D (pipe diameters) in front of the plate and the low pressure (outlet or downstream) tapping is considered to be 8D downstream of the plate.

Orifice plate bore profiles

McMenon offers a variety of orifice plate bore profiles for restriction plates and these can be classified as follows:

- circular bore, single square-edged hole, concentric with the pipe
- circular bore, multiple square-edged holes across the plate face
- circular bore, multiple profiled-inlet holes across the plate face

Multiple-stage fabricated assemblies are also available, designed specifically for an application.

McMenon restriction 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.

Applications

Restriction orifice plates are an incredibly versatile technology and can be used wherever a specific pressure drop is required or where the flowrate is to be limited to a certain value, irrespective of changes in the downstream pressure.

Comprehensive documentation

McMenon 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 McMenon 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
ISO TN 29001:2010

Environmental impact

ISO 14001
EMS 40882

EU Pressure Equipment Directive

97/23/EC

Design

R W Miller

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
Noise calculations
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.

Specification

Materials

Plates:	Standard – 316/316L stainless steel
Other plate materials:	304 St Stl; 310 St Stl; 321 St Stl; 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;
Gaskets:	For RTJ flanges *: 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 FPD190.P2, the gasket material is the orifice plate holder material.
For FPD190.P3, 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)

DN15 to 900 ($\frac{1}{2}$ to 36 in.). Other sizes may be possible.

Plate thickness

McMenon Standard: 3; 6; 10 mm
Others available: 1.5; 2; 4; 8; 12; 15; 16 mm
 $\frac{1}{2}$; $\frac{3}{4}$ in.

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

Calculation standards

R W Miller

Design standards

Plate: Preferred – McMenon
Others: Saudi Aramco; Shell

Pipeline installation

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.

Ordering information

		Main code										Optional code							
FPD190 restriction orifice plates		FPD190	XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XXX	XX	XX	XXX	XX	XXX	XXX
See pages 8, 9 and 10																			
Product design																			
Restriction plate only			R1																
Restriction RTJ F integral carrier – counter bore			R2																
Restriction RTJ F integral carrier – solid			R3																
Restriction – multi stage			R4																
Restriction – single stage multi hole			R5																
Customer-specific design																			
McMenon			A1																
standard Aramco			A2																
standard Shell			S1																
Orifice design																			
Restriction plate – no tappings					Y0														
Line nominal bore																			
DN 15 (1/2 in.)					015														
DN 20 (3/4 in.)					020														
DN 25 (1 in.)					025														
DN 32 (1 1/4 in.)					032														
DN 40 (1 1/2 in.)					040														
DN 50 (2 in.)					050														
DN 65 (2 1/2 in.)					065														
DN 80 (3 in.)					080														
DN 90 (3 1/2 in.)					090														
DN 100 (4 in.)					100														
DN 125 (5 in.)					125														
DN 150 (6 in.)					150														
DN 200 (8 in.)					200														
DN 250 (10 in.)					250														
DN 300 (12 in.)					300														
DN 350 (14 in.)					350														
DN 400 (16 in.)					400														
DN 450 (18 in.)					450														
DN 500 (20 in.)					500														
DN 550 (22 in.)					550														
DN 600 (24 in.)					600														
DN 650 (26 in.)					650														
DN 700 (28 in.)					700														
DN 750 (30 in.)					750														
DN 800 (32 in.)					800														
DN 850 (34 in.)					850														
DN 900 (36 in.)					900														
DN 950 (38 in.)					950														
DN 1000 (40 in.)					001														
DN 1050 (42 in.)					051														
Others					999														

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FPD190

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Main code											Optional code															
FPD190											XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XXX	XX	XXX	XX	XXX	XX
See page 5											page 6		See pages 8, 9 and 10													
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																										
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															

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FPD190

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	FPD190	XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XXX	XXX	XX	XX	XXX	XX	XXX	XXX
		See page 5				page 6		See page 7											
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																			
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								

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	FPD190	XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XXX	XXX	XXX	XXX	XX	XX	XXX	XX	XXX	XXX
		See page 5				page 6		See page 7			See page 8										
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		

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FPD190

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	FPD190	XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XXX	XXX	XXX	XXX	XX	XXX	XXX		
	See page 5				page 6		See page 7			See page 8			See page 9							
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				

Notes

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Note

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