



# PRESSURE MEASURING WITH FFD DIAPHRAGM





## Introductions

The FFD is typically used in combination with (differential) pressure transmitters for level, flow and pressure measurement, in those applications where the diaphragm need to be flush with the vessel wall or where insulation layers need to be passed. The EXT is recommended when extended seals are required fully in exotic materials and/or when special grade cover flanges are required for pressure/temperature rating. The seal body is made of Bar stock or forged material. Its pressure rating is defined by the back-up flange and as such it can be used for pressure ratings determined by the licensor.



## Size, rating and Facing

### Flange & Diaphragm materials

The flange can be supplied in several materials. Some of the standard materials are:

Flanged Material	Diaphragm Material
AISI 316(L)	AISI 316L Alloy C276 Tantalum Monel 400 Inconel 625
AISI 304L or AISI 316(L)	AISI 316L
AISI 310 or AISI 316(L)	AISI 316L
AISI 321 or AISI 316(L)	AISI 316L
Alloy 625 or AISI 316(L)	Alloy 625
AISI 316(L)	Alloy 625
Alloy C-276 or AISI 316(L)	Alloy C-276
Duplex F51/F60 or AISI 316(L)	AISI 316L
Duplex F53 or AISI 316(L)	AISI 316L
AISI 316(L)	Nickel 200 Monel 400 Inconel 625
Titanium Gr. 2	Titanium Gr. 2

### Flange size, rating

ASME B16.5		
Size	Rating	Facing
1" to 4" (DN20 to DN100)	cl. 150 - cl. 2500 (PN10-400)	RF, LMF, FF, SGF RJF, SFF SMF, LTF, STF, LGF, LFF

EN 1092-1 - 2018		
Size	Rating	Type
DN20 to DN100	PN10-400	A, B1, E, F B2, C, D, G, H

API ISO 10423 - 2010		
Size	Rating	Facing
1-13/16" to 3-1/16"	69 – 138 MPa	6BX – RJF
2-1/16" to 3-1/8"	13.8 – 34.5 MPa	6B-RJF

JIS B2220 – 2012		
Size	Rating	Type
DN25 to DN100	10-20K	RF

GOST 33259 - 2015		
Size	Rating	Type
DN20 to DN100	PN10-250	A, B, C, D E, F L, M J



## Specification

### Gold coatings

Several types of gold coating can be applied on the seals. The selection possibilities are:

- 25 µm chemical resistance
- 40 µm chemical resistance

### Polymer coatings

Polymer coatings come in several types. The technical data on thickness and temperature limitation can be found in datasheet “polymer solutions” The applicable selection on BF seals are:

- PTFE coating
- Ceramic coating

### Capillary tube and armor (protection)

The standard capillary mounting position is top side (axial) of the seal. Alternatively, the capillary can be placed at the side of the seal (radial). The standard tube material is TP316 (316SS). There are three options in ID of the capillary 1mm. Aramak capillaries are always protected against mechanical forces by armor. This doubled shielded armor consist is standard AISI 304, and optionally AISI 316. Additionally, the armor could be protected with a PVC sleeve in white, black, optionally with Yellow to protect against dust and water ingress and possibly corrosive ambient atmosphere.



### Cover Flange

The DFW will be clamped to the process. This can be done with a standard blind flange. However, positioning the seal in line with the flange and gasket will be challenging. Therefore, Aramak offers the option for a cover flange. This flange has a groove to fit the seal part and fixing holes to fix the seal into the flange. Details can be found in the dimension's section.

### Material Certification

Material traceability and related certification are applicable for all process wetted parts. Material certification possibilities depend on the type of seal, the assembly construction and the materials used. Material certification is in accordance with EN10204 3.1 Additional material certification and testing can be provided on request, such as Positive Material Identification (PMI), NACE conformity for ISO-15156 (MR-0175) and/or ISO-17945 (MR-0103), and many more.

### Material limitations

Zirconium and Titanium versions of the FFD cannot be welded with stainless steel. This results in a screwed connection. For this occasion we developed a special connection based on the high pressure connection.

### Lifting handles

Larger sizes and ratings of diaphragm seals can weigh up to 50 kg. Handling and installation can become a challenge. As from 15kg it is recommended to apply a set of lifting handles, welded on the sides of the flange of the seal. This can be used to handle it easier and install it in a safer way or have attach lifting tools to it.

### Flush rings and flush flanges

Aramak offers matching flush rings or flush flanges to their diaphragm seal. On request equipped with blind plugs, vent plug and or flushing / draining needle valves, which can be fitted or welded to the complete construction.

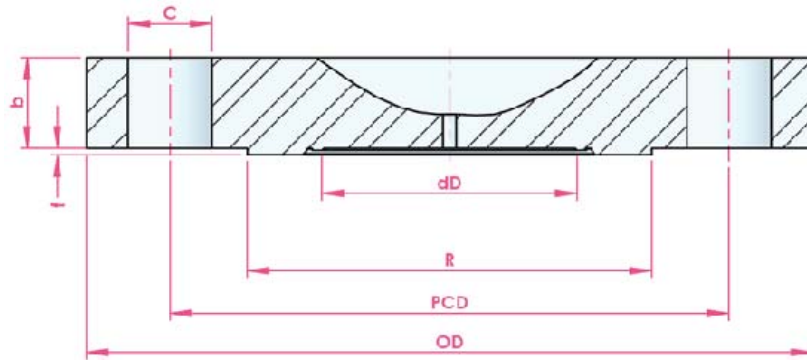
### Cooling options

There are several ways to protect the instrument from elevated temperatures, such as the extended direct mount, a temperature reducer or by means of capillary.



# Dimensions table

## ASME 16.5 RF facing

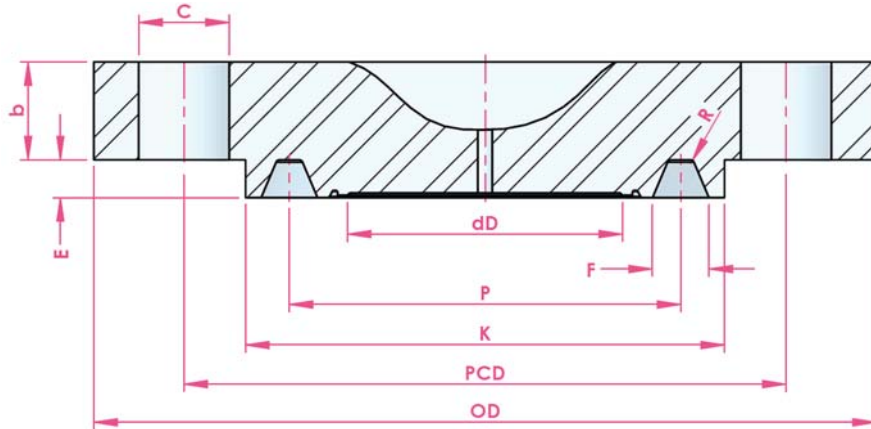


size	rating	OD	b	PCD	C / pcs	dD	R	f
1"	cl. 150	108.0	12.7	79.2	15.9 / 4x	25	50.8	1.5
	cl. 300	124.0	15.7	88.9	19.1 / 4x			6.4
	cl. 400-600	149.0	17.5	101.6	25.4 / 4x			1.5
	cl. 900-1500	159.0	28.4	108.0	15.9 / 4x			6.4
1.25"	cl. 150	117.0	14.2	88.9	15.9 / 4x	35	63.5	1.5
	cl. 300	133.0	17.5	98.6	19.1 / 4x			6.4
	cl. 400-600	159.0	20.6	111.1	25.4 / 4x			1.5
	cl. 900-1500	184.0	28.4	130.0	28.6 / 4x			6.4
1.5"	cl. 150	127.0	15.9	98.6	15.9 / 4x	45	73.0	1.5
	cl. 300	155.0	19.0	114.3	22.3 / 4x			6.4
	cl. 400-600	178.0	22.4	124.0	28.6 / 4x			1.5
	cl. 900-1500	203.0	31.8	146.0	31.8 / 4x			6.4
2"	cl. 150	152.0	17.5	120.6	19.1 / 4x	54	92	1.5
	cl. 300	165.0	20.6	127.0	19.1 / 8x			6.4
	cl. 400-600	216.0	25.4	165.1	25.4 / 8x			1.5
	cl. 900-1500	235.0	38.1	171.4	28.6 / 8x			6.4
3"	cl. 150	190.0	22.4	152.4	19.1 / 4x	75	127.0	1.5
	cl. 300	210.0	26.9	168.1	22.3 / 8x			6.4
	cl. 400-600	241.0	31.8	190.5	25.4 / 8x			1.5
	cl. 900	267.0	24.8	203.2	31.9 / 8x			6.4
4"	cl. 1500	305.0	66.5	228.6	35.0 / 8x	89	157	1.5
	cl. 150	229.0	22.4	190.5	19.1 / 8x			6.4
	cl. 300	254.0	30.2	200.2	22.3 / 8x	1.5		
	cl. 400	273.0	35.1	215.9	25.5 / 8x	6.4		
	cl. 600	292.0	44.5	235.0	31.8 / 8x	1.5		
	cl. 900	311.0	53.8	241.3	34.9 / 8x	6.4		
	cl. 1500	311.0	53.8	241.3	34.9 / 8x	1.5		
	cl. 2500	356.0	76.2	273.0	41.3 / 8x	6.4		



# Dimensions table

## ASME 16.5 RJF facing

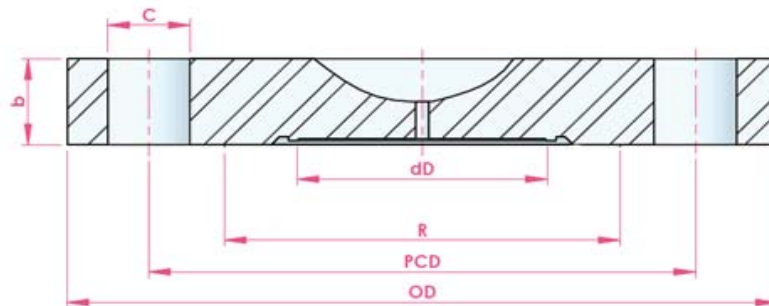


size	rating	OD	b	PCD	C/pcs	dD	K	E	F	P	R	Ring #				
1"	cl. 150	108.0	12.7	79.2	15.9 / 4x	35	63.5	6.35	8.74	47.62	0.8	15				
	cl. 300	124.0	15.7	88.9	19.1 / 4x		69.8			50.80		16				
	cl. 400-600		28.4		25.4 / 4x		71.4			60.33		18				
	cl. 900-1500		35.1		25.4 / 4x		82.6			60.33		18				
	cl. 2500		159.0		35.1		108.0			25.4 / 4x		82.6	6.35	8.74	60.33	18
1.25"	cl. 150	117.0	14.2	88.9	15.9 / 4x	45 54	73..2	7.92	11.91	57.15	0.8	17				
	cl. 300	133.0	17.5	98.6	19.1 / 4x		79.2			60.33		18				
	cl. 400-600		20.6		25.4 / 4x		81.0			72.24		21				
	cl. 900-1500		28.4		28.6 / 4x		102.0			72.24		21				
	cl. 2500		184.0		38.1		130.0			28.6 / 4x		102.0	7.92	11.91	72.24	21
1.5"	cl. 150	127.0	15.9	98.6	15.9 / 4x	54 54	82.6	6.35	8.74	65.07	0.8	19				
	cl. 300	155.0	19.0	114.3	22.3 / 4x		90.4			68.28		20				
	cl. 400-600		22.4		28.6 / 4x		91.9			68.28		20				
	cl. 900-1500		31.8		31.8 / 4x		114.0			68.28		20				
	cl. 2500		203.0		44.4		146.0			31.8 / 4x		114.0	7.92	11.91	72.24	23
2"	cl. 150	152.0	17.5	120.6	19.1 / 8x	54 60	102.0	6.35	8.74	82.55	0.8	22				
	cl. 300	165.0	20.6	127.0	19.1 / 8x		108.0			82.55		23				
	cl. 400-600		25.4		25.4 / 8x		124.0			82.55		23				
	cl. 900-1500		216.0		38.1		165.1			25.4 / 8x		124.0	7.92	11.91	95.25	24
	cl. 2500		235.0		50.8		171.4			28.6 / 8x		133.0	6.35	8.74	101.60	26
3"	cl. 150	190.0	22.4	152.4	19.1 / 4x	75 89	133.0	6.35	8.74	114.30	1.5	29				
	cl. 300	210.0	26.9	168.1	22.3 / 8x		146.0			114.30		31				
	cl. 400-600		31.8		25.4 / 8x		156.0			114.30		31				
	cl. 900		38.1		31.8 / 8x		168.0			114.30		31				
	cl. 1500		24.8		31.8 / 8x		168.0			114.30		31				
4"	cl. 2500	305.0	66.5	228.6	34.9 / 8x	75 89	168.0	9.522	13.49	127.00	0.8	32				
	cl. 150	229.0	22.4	190.5	19.1 / 8x		171.0			6.35		8.74	114.30	29		
	cl. 300	254.0	30.2	200.2	22.3 / 8x		175.0			149.22		37				
	cl. 400		35.1		25.4 / 8x		175.0			149.22		37				
	cl. 600		38.1		215.9		25.4 / 8x			181.0		149.22	37			
cl. 900	44.5		235.0		31.8 / 8x	181.0	149.22	37								
4"	cl. 1500	311.0	53.8	241.3	34.9 / 8x	75 89	194.0	11.13	16.66	161.92	1.5	39				
	cl. 2500	356.0	76.2	273.0	41.3 / 8x		203.0			157.18		38				



# Dimensions table

## ASME 16.5 FF facing

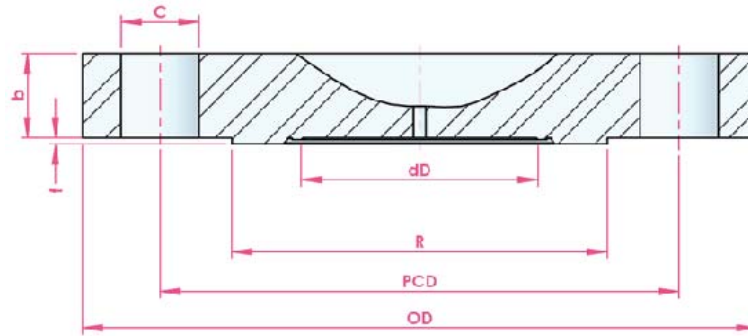


size	rating	OD	b	PCD	C / pcs	dD	G	R-1	G
1"	cl. 150	108.0	12.7	79.2	15.9 / 4x	25	31.7	50.8	31.8
	cl. 300	124.0	15.7	88.9	19.1 / 4x				
	cl. 400-600	149.0	28.4	101.6	25.4 / 4x				
	cl. 2500	159.0	35.1	108.0	25.4 / 4x				
1.25"	cl. 150	117.0	14.2	88.9	15.9 / 4x	35	40.1	63.5	41.5
	cl. 300	133.0	17.5	98.6	19.1 / 4x				
	cl. 400-600	159.0	20.6	111.1	25.4 / 4x				
	cl. 2500	184.0	38.1	130.0	28.6 / 4x				
1.5"	cl. 150	127.0	15.9	98.6	15.9 / 4x	45	51.6	73.0	52.4
	cl. 300	155.0	19.0	114.3	22.3 / 4x				
	cl. 400-600	178.0	22.4	124.0	28.6 / 4x				
	cl. 900-1500	203.0	44.4	146.0	31.8 / 4x				
2"	cl. 150	152.0	17.5	120.6	19.1 / 4x	54 60	66.4	91.9	70.2
	cl. 300	165.0	20.6	127.0	22.3 / 8x				
	cl. 400-600	216.0	38.1	165.1	25.4 / 8x				
	cl. 900-1500	235.0	50.8	171.4	28.6 / 8x				
3"	cl. 150	190.0	22.4	152.4	19.1 / 4x	75 89	89.2	127.0	93.0
	cl. 300	210.0	26.9	168.1	22.3 / 8x				
	cl. 400-600	241.0	31.8	190.5	25.4 / 8x				
	cl. 900	267.0	38.1	203.2	31.9 / 8x				
4"	cl. 150	229.0	22.4	190.5	19.1 / 8x	75 89	89.2	157.2	93.0
	cl. 300	254.0	30.2	200.2	22.3 / 8x				
	cl. 400	273.0	35.1	215.9	25.5 / 8x				
	cl. 600	292.0	44.5	235.0	31.8 / 8x				
4"	cl. 900	311.0	53.8	241.3	34.9 / 8x	75 89	89.2	157.2	93.0
	cl. 1500	311.0	53.8	241.3	34.9 / 8x				
	cl. 2500	356.0	76.2	273.0	41.3 / 8x				



# Dimensions table

## EN 1092-1 type B1/B2: Raised face

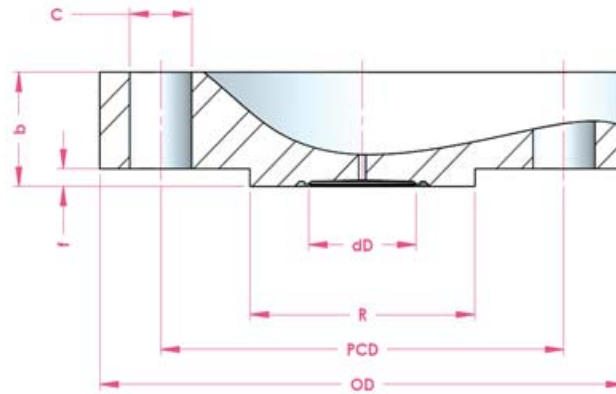


size	rating	OD	b	PCD	C / pcs	dD	R	f	G
DN25	PN10-40	115.0	18.0	85.0	14.0 / 4x				
	PN63-100	140.0	24.0	100.0	18.0 / 4x				
	PN160	150.0	28.0	105.0	22.0 / 4x	35	68.0		40.1
	PN250	160.0	34.0	115.0	26.0 / 4x			2.0	
	PN320	180.0	38.0	130.0	26.0 / 4x				
	PN400	180.0	38.0	130.0	26.0 / 4x				
DN40	PN10-40	150.0	18.0	110.0	18.0 / 4x				
	PN63-100	170.0	26.0	125.0	22.0 / 4x				
	PN160	170.0	28.0	125.0	26.0 / 4x	45	88.0		51.6
	PN250	185.0	34.0	135.0	26.0 / 4x	54			
	PN320	195.0	38.0	145.0	30.0 / 4x				
	PN400	220.0	48.0	165.0	30.0 / 4x				
DN50	PN10-40	165.0	20.0	125.0	18.0 / 4x				
	PN63	180.0	26.0	135.0	22.0 / 4x				
	PN100	195.0	28.0	145.0	26.0 / 4x	54	102.0		66.4
	PN160	195.0	30.0	145.0	26.0 / 4x	60			
	PN250	200.0	38.0	150.0	26.0 / 8x			3.0	
	PN320	210.0	42.0	160.0	30.0 / 8x				
DN80	PN400	235.0	52.0	180.0	30.0 / 8x				
	PN10-40	200.0	24.0	160.0	18.0 / 8x				
	PN63	215.0	28.0	170.0	22.0 / 8x				
	PN100	230.0	32.0	180.0	26.0 / 8x				
	PN160	230.0	36.0	180.0	30.0 / 8x		138.0		
	PN250	255.0	46.0	200.0	30.0 / 8x				
DN100	PN320	275.0	55.0	220.0	33.0 / 8x				
	PN400	305.0	68.0	240.0	33.0 / 8x				
	PN10-16	220.0	20.0	180.0	18.0 / 8x	75	158.0		89.2
	PN25-40	235.0	24.0	190.0	22.0 / 8x	89			
	PN63	250.0	30.0	200.0	26.0 / 8x				
	PN100	265.0	36.0	210.0	30.0 / 8x		162.0		
DN100	PN160	265.0	40.0	210.0	30.0 / 8x				
	PN250	300.0	54.0	235.0	33.0 / 8x				
	PN320	335.0	65.0	265.0	36.0 / 8x				
	PN400	370.0	80.0	295.0	39.0 / 8x				



# Dimensions table

## EN 1092-1 type E: Spigot



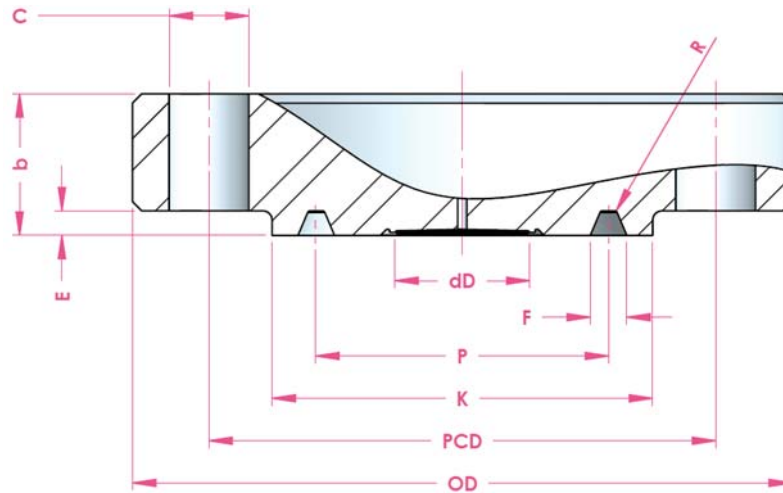
size	rating	OD	b	PCD	C / pcs	dD	R	f	G
DN25	PN10-40	115.0	18.0	85.0	14.0 / 4x	35.0	57.0	2.0	40.1
	PN63-100		24.0	100.0	18.0 / 4x				
	PN160	150.0	28.0	105.0	22.0 / 4x				
	PN250		34.0	115.0	26.0 / 4x				
	PN320		38.0	130.0	26.0 / 4x				
	PN400		180.0	38.0	130.0				
DN40	PN10-40	150.0	18.0	110.0	18.0 / 4x	45.0 54.0	75.0	3.0	51.6
	PN63-100	170.0	26.0	125.0	22.0 / 4x				
	PN160		28.0		26.0 / 4x				
	PN250	185.0	34.0	135.0	26.0 / 4x				
	PN320	195.0	38.0	145.0	30.0 / 4x				
	PN400	220.0	48.0	165.0	30.0 / 4x				
DN50	PN10-40	165.0	20.0	125.0	18.0 / 4x	54.0 75.0	87.0	3.0	66.4
	PN63	180.0	26.0	135.0	22.0 / 4x				
	PN100	195.0	28.0	145.0	26.0 / 4x				
	PN160		30.0		26.0 / 8x				
	PN250	200.0	38.0	150.0	26.0 / 8x				
	PN320	210.0	42.0	160.0	30.0 / 8x				
PN400	235.0	52.0	180.0	30.0 / 8x					
DN80	PN10-40	200.0	24.0	160.0	18.0 / 8x	75.0 90.0	120.0	3.0	89.2
	PN63	215.0	28.0	170.0	22.0 / 8x				
	PN100	230.0	32.0	180.0	26.0 / 8x				
	PN160	230.0	36.0		30.0 / 8x				
	PN250	255.0	46.0	200.0	30.0 / 8x				
	PN320	275.0	55.0	220.0	33.0 / 8x				
PN400	305.0	68.0	240.0	33.0 / 8x					
DN100	PN10-16	220.0	20.0	180.0	18.0 / 8x	75.0 90.0	149.0	3.0	89.2
	PN25-40	235.0	24.0	190.0	22.0 / 8x				
	PN63	250.0	30.0	200.0	26.0 / 8x				
	PN100	265.0	36.0	210.0	30.0 / 8x				
	PN160		40.0		33.0 / 8x				
	PN250		300.0		54.0				
	PN320	335.0	65.0	265.0	36.0 / 8x				
PN400	370.0	80.0	295.0	39.0 / 8x					





## Dimensions table

### API 6A 10423 – Type 6B



size	rating	OD	b	PCD	C / pcs	dD	K	E	F	P	ring	
2-1/16"	13.8MPa	165.0	33.4	127.0	20.0 / 8x	45	108.0	7.9	11.9	82.6	R or RX-23	
	20.7MPa	215.0	46.1	165.1	26.0 / 8x		124.0			95.2	R or RX-24	
	34.5MPa						127.0			101.6	R or RX-26	
2-9/16"	13.8MPa	190.0	36.6	149.2	23.0 / 8x	54 60	137.0	7.9	11.9	107.9	R or RX-27	
	20.7MPa	245.0	49.3	190.5	29.0 / 8x					146.0	123.8	R or RX-31
	34.5MPa	245.0	49.3	190.5						156.0	136.5	R or RX-35
3-1/8"	13.8MPa	210.0	39.7	168.3	23.0 / 8x	75 89	168.0	7.9	11.9	123.8	R or RX-31	
	20.7MPa	240.0	46.1	190.5	26.0 / 8x					156.0	136.5	R or RX-35
	34.5MPa	265.0	55.6	203.2	32.0 / 8x					168.0	136.5	R or RX-35



## Ordering Information

FFD-	XX	XX	XX	XX	XXX	XX	XX	XXX
<b>Standards</b>								
ASME 16.5 RF facing	RF							
ASME 16.5 RTJ	RJ							
ASME 16.5 FF facing	FF							
EN 1092-1 type B1/B2	B1							
EN 1092-1 B1 type	EB							
EN 1092-1 type E	EE							
ISO 10423 6BX Type	IS							
API 6A 10423 – Type 6B	A6							
Other	OT							
<b>Size</b>								
DN 25 (1 in.)		25						
DN 40 (1 1/2 in.)		40						
DN 50 (2 in.)		50						
DN 65 (2 1/2 in.)		65						
DN 80 (3 in.)		80						
DN 90 (3 1/2 in.)		90						
DN 100 (4 in.)		10						
Others		99						
<b>Rating</b>								
ANSI Class 150			A1					
ANSI Class 300			A2					
ANSI Class 600			A3					
ANSI Class 900			A4					
ANSI Class 1500			A5					
ANSI Class 2500			A6					
PN 10			P1					
PN 16			P2					
PN 25			P3					
PN 40			P4					
PN 63			P5					
PN 100			P6					
PN 160			P7					
<b>Diaphragm Material</b>								
316 / 316L stainless			I1					
Alloy 625			I6					
Alloy C276			I8					
Titanium			I2					
Tantalum			I3					
Nickel 200			I4					
Other			P5					



## Ordering Information

<b>Flanged Material</b>				
316 / 316L stainless		I1		
310 stainless steel		I2		
321 stainless steel		I3		
22 % Cr duplex		I4		
Alloy 400		I5		
Alloy 625		I6		
Alloy 800		I7		
Alloy C276		I8		
Other		P5		
<b>Capillary Length</b>				
Not Applicable		NA		
1 m		N1		
2 m		N2		
3 m		N3		
4 m		N4		
5 m		N5		
6 m		N6		
7 m		N7		
8 m		N8		
10 m		N9		
Other		N0		
<b>Bolt &amp; Nut</b>				
Not Applicable			0	
C.S A192/A193			CS	
C.S A192/A193 Cold Galvanized			CG	
C.S A192/A193 ETFE Coated			CE	
C.S A192/A193 Zinc Reach			CZ	
Stainless Steel 304 A192/A193			S1	
Stainless Steel 316 A192/A194			S2	
Other			O1	
<b>Certification</b>				
Material certificates				C0
Material NACE MR0175				C1
Material NACE MR0103				C2
100% dimensional check				C3
Hardness survey				C4
Impact testing @ -196 °C (-320.8 °F)				C5
Others				C6
<b>Added requirements</b>				
Extension Diameter in mm (optional)				XX
Manufactured to customer drawing				DW
Flushing Ring				FR



## Ordering Information

Handle		HD
Gate Valve 1/2" Carbon Steel		GV1
Gate Valve 1/2" Stainless Steel 304		GV2
Gate Valve 1/2" Stainless Steel 316		GV3
Ball Valve 1/2" Stainless Steel 304		BV1
Ball Valve 1/2" Stainless Steel 316		BV2
Niddle Valve 1/2" Stainless Steel 304		NV1
Niddle Valve 1/2" Stainless Steel 316		NV2
Nipple Carbon Steel 1/2*1/2" Male		NP1
Nipple Stainless Steel 304, 1/2*1/2" Male		NP2
Nipple Stainless Steel 316, 1/2*1/2" Male		NP3
Others		OT



## Contact us

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