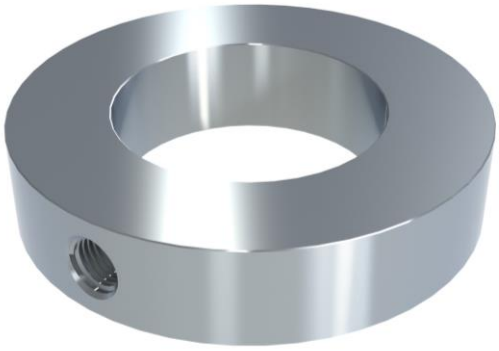
Flush accessory – Flush ring



Design description

The flush ring is made of bar stock or forged material. The ring contains one or two flush holes. The flush holes can be selected in most common sizes. The flush ring is clamped between process and instrument flange and is therefore limited by the pressure rating of either of those flanges. All kind of facings are available on the flush ring.

Flush ring materials

The flush ring can be made in several materials. In the table below is a selection of materials.

Material		
tradename	UNS	Wst.
AISI 316(L)	S31603	1.4404
AISI 304L	S30400	1.4306
AISI 310 MoLn	S31050	1.4466
AISI 316 UG	S31600	1.4435
AISI 321	S32100	1.4541
AISI 904(L)	N08904	1.4539
Alloy 20	N08020	2.4660
Alloy 400	N04400	2.4360
Alloy 600	N06600	2.4816
Alloy 625	N06625	2.4856
Alloy 825	N08825	2.4858
Alloy B2	N10665	2.4617
Alloy C-22	N06022	2.4602
Alloy C-276	N10276	2.4810
Duplex F44	S31254	1.4547
Duplex F51/F60	S32205	1.4462
Duplex F53	S32750	1.4410
Duplex F55	S32750	1.4410
Nickel 201	N02201	2.4068
Titanium Gr. 2	R50400	3.7035
Zirconium 702	R60702	-

Size, rating and facings - ASME B16.5

ASME B16.5			
Size	Rating	Facing	Roughness
1" to 4"	cl. 150 - cl. 2500	RF, LMF, SGF	Ra 3.2-6.3 µm
		RJF	Ra <1.6 µm
		SMF, LTF, STF, LGF, LFF, SFF	Ra <3.2 µm

Size, rating and facings - EN 1092-1

EN 1092-1			
Size	Rating	Type	Roughness
DN20 to DN100	PN10-400	A, B1, E, F	Ra 3.2-12.5 µm
		B2, C, D, G, H	Ra <0.8-3.2 µm

Size, rating and facings - ISO 10423 (API)

API ISO 10423			
Size	Rating	Facing	Roughness
1-13/16" to 3-1/16"	69 – 138 MPa	6BX – RJF	Ra <1.6 µm
2-1/16" to 3-1/8"	13.8 – 34.5 MPa	6B-RJF	Ra <1.6 µm

Size, rating and facings - EN 1092-1

JIS B2220			
Size	Rating	Type	Roughness
DN25 to DN100	10-20K	RF	Ra 3.2-12.5 µm

Material Certification

Material traceability and related certification are applicable for all process wetted parts. Material certification possibilities depend on the type of ring, 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), Intergranular corrosion (IGC) testing, material certification in accordance with EN10204 3.2, NACE conformity for ISO-15156 (MR-0175) and/or ISO-17945 (MR-0103), NORSOK M-630 and many more.

-> Please note that the responsibility for material selection always rests with the user.

Marking & Traceability

All flush rings are marked by the forging shop with heat number, material designation, size, and rating. Badotherm adds a Badotherm reference number and the manufacturers name to the rings for traceability purposes.

Material and origin

The flush rings are made from forged materials according to the applicable standards. The standard sourcing of material is of international origin. Optionally regional preference can be requested, for example materials from EU origin.

Cleanliness of the wetted parts

All parts are standard cleaned from excessive oil and grease. When additional requirements are needed, the parts can be cleaned according customer requirements and cleaning specifications.

Gaskets

Sizes of the diaphragm area are designed to match the gaskets used between the process and seal or flush ring. For the ASME B16.5 RF rings the ASME B16.20 is used for dimension restriction to ensure both the spiral and grooved gaskets are fully supported by the serrated area. For the EN type B1 rings the gasket dimensions are matching the sizes of the EN 1514-2. The size “A” in the tables refer to the start of the gasket surface.

Pressure testing

All assembled flush rings are pressure tested. The methods are described below.

Standard testing

In line with the EN 12266-1 each sealing point will be 100% tested with leak detection fluid under standard test pressure. The test medium is a gas. At leaking point, after application of the leak detection fluid, bubbles become visible. This bubble detection method can detect leak rates of approximately $1x10^{-3}$ mbar l/s. Assemblies of flush rings with plugs or valves are leak tested by this method. During the leak test all fittings and welds are tested at 6 bar for 30 seconds after application of the leak detection fluid.

Optional test method

Additionally to the standard method the assemblies of and flush rings combined with plugs or valves can be tested at customer determined pressure values with a maximum of 150% of the MWP. The 6 bar of air in the standard method will be changed to the customer value of 150% of the MWP. Above 150 bar the test medium will be changed from gas to liquid.

Ring thickness

Thickness of the ring is depending on flush hole size. The dimensions tables are based on ½” flush connections. For ¼”, ¾”, BW, SW connection below rules can be followed.

Flush size	RF /B1 facing	RJF facing
¼”	20.0	B = 20 + 2*E
½”	35.0	50.0
¾”	40.0	B = 40 + 2*E
Butt weld ½” / 20mm	24.0	35.0
Butt weld ¾” / 28mm	30.0	
Socket weld ½”	33.5	50.0
Socket weld ¾”	41.0	B = 41 + 2*E

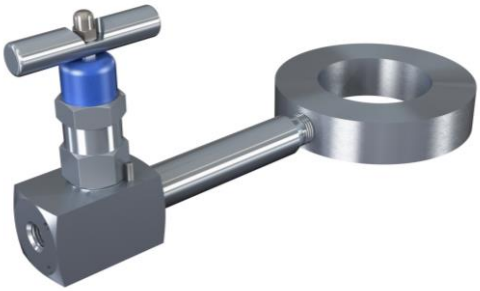
Flush connections

Flush ports can be made in all kind of variations both threaded as weld connection.

Flush size	following standard
G ¼”, G ½”, G ¾”	ISO 228 thread (acc DIN 3852-2 / ISO 1179-4)
¼”, ½”, ¾” NPT	ASME B1.20.1
Butt weld ½” / 20mm	ASME B16.9 / EN 12627
Butt weld ¾” / 28mm	
Socket weld ½”	ASME B16.11 / EN 12760
Socket weld ¾”	

Assemblies

The flush rings are typical used for vent or drain the process when installed under a pressure instrument like a pressure gauge or pressure transmitter. Venting the process can be made easy by installing a needle valve, extension pipe or welding neck flange to the flush ring. These assemblies are common practice for Badotherm and can be welded, tested and assembled in advance.

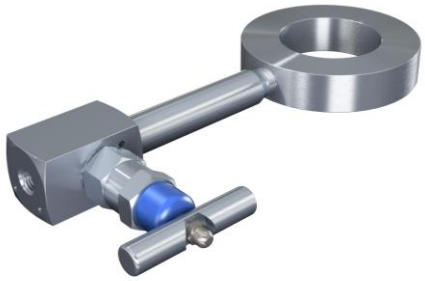


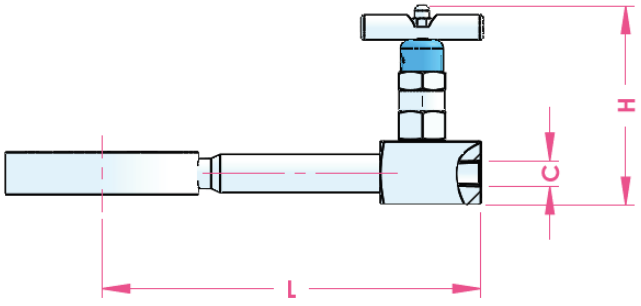
Orientation

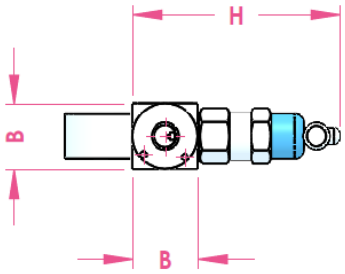
Mounting flush devices vertical or horizontal can results in difficulties in orientation. There are two main positions of the valve operating handle.

Position 1: this is the default position of the valve and most commonly used in vertical setup. This way the valve faces forward for easy operating.

Position 2: The valve handle are rotated 90° so the valve handles are facing forward in case of horizontal assembly.



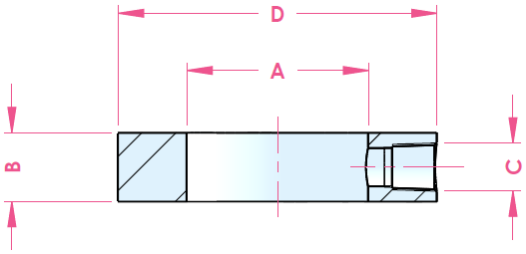




size	Rating - Facing	L	H	B	C
1”	cl. 150-2500 RF	151.0	102.3	30.0	½” NPT
1.5”		162.0			
2"		171.0			
3"		189.0			
4"		204.0			

size	Rating - Facing	L	H	B	C
DN20	PN10-100 B1	154.6	102.3	30.0	½” NPT
DN25	PN10-400 B1	159.0			
DN32	PN10-100 B1	78.0			
DN40	PN10-400 B1	169.0			
DN50		176.0			
DN80		194.0			
DN100	PN10-16 B1	204.0			
	PN25-100 B1	206.0			

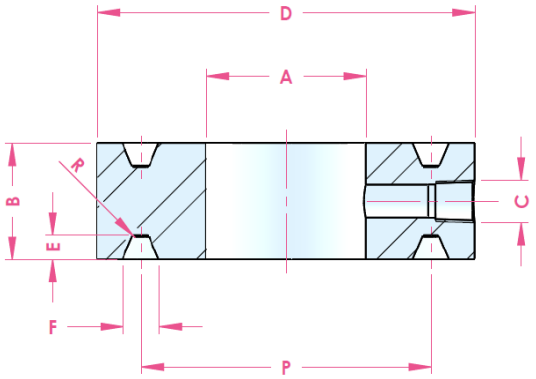
Dimensions table: ASME 16.5 RF facing



size	rating	D	A	B	C	weight
¾"	cl. 150-2500	42.9*1	21.0	35	½" NPT	0.3 kg
1"		50.8	26.6			0.4 kg
1.25"		63.5	35.1			0.6 kg
1.5"		73.0	40.9			0.8 kg
2"		91.9	52.5			1.3 kg
2.5"		104.8	62.7			
3"		127.0	77.9			2.4 kg
4"		157.2	102.3			3.7 kg

All dimensions in mm
Note 1: due to limited wall thickness, D may be increased to 53.9 in order to fit ½" thread.

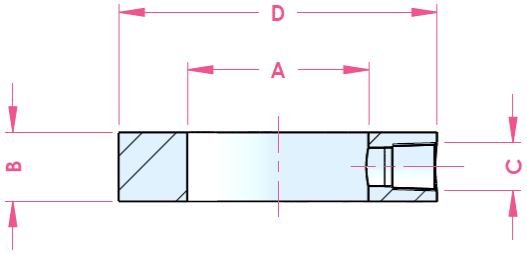
Dimensions table: ASME 16.5 RJF facing



size	rating	D	A	B	E	F	P	R	C	Ring #	weight
1"	cl. 150	63.5	26.6	50.0	6.4	8.7	47.62	0.8	½" NPT	15	0.7 kg
	cl. 300	70.0					50.80			16	0.9 kg
	cl. 400-600										0.9 kg
	cl. 900-1500	71.5									0.9 kg
	cl. 2500	82.6					60.33			18	1.3 kg
1.5"	cl. 150		40.9				65.07			19	1.3 kg
	cl. 300	90.5					68.27			20	1.4 kg
	cl. 400-600										1.4 kg
	cl. 900-1500	92.0									1.6 kg
	cl. 2500	114.0			7.9	11.9	82.55			23	2.3 kg
2"	cl. 150	102.0	52.5		6.4	8.7				22	1.8 kg
	cl. 300	108.0			7.9	11.9				23	2.1 kg
	cl. 400-600										2.1 kg
	cl. 900-1500	124.0					95.25			24	2.8 kg
	cl. 2500	133.0					101.60			26	3.1 kg
3"	cl. 150		77.9		6.4	8.7	114.30			29	3.1 kg
	cl. 300	146.0			7.9	11.9	123.83			31	3.7 kg
	cl. 400-600										3.7 kg
	cl. 900	156.0									4.2 kg
	cl. 1500	168.0					136.52			35	5.0 kg
	cl. 2500				9.5	13.5	127.00	1.5		32	5.0 kg
4"	cl. 150	171.0	102.3		6.4	8.7	149.22	0.8		36	5.8 kg
	cl. 300	175.0			7.9	11.9				37	5.5 kg
	cl. 400										5.5 kg
	cl. 600										5.5 kg
	cl. 900	181.0									6.1 kg
	cl. 1500	194.0					161.92			39	7.2 kg
	cl. 2500	203.0			11.1	16.7	157.18	1.5		38	7.9 kg

All dimensions in mm

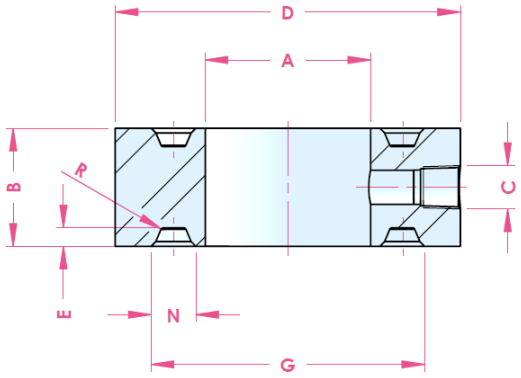
Dimensions table: EN 1092-1 B1 type



size	Rating	D	A	B	C	weight
DN20	PN10-100	58.0	22.3	35	½" NPT	0.4 kg
DN25	PN10-400	68.0	28.5			1.0 kg
DN32	PN10-100	78.0	37.2			1.3 kg
DN40	PN10-400	88.0	43.1			2.4 kg
DN50		102.0	53.9			3.2 kg
DN80		138.0	80.9			
DN100	PN10-16	158.0	104.3			3.7 kg
	PN25-100	162.0	104.3			

All dimensions in mm

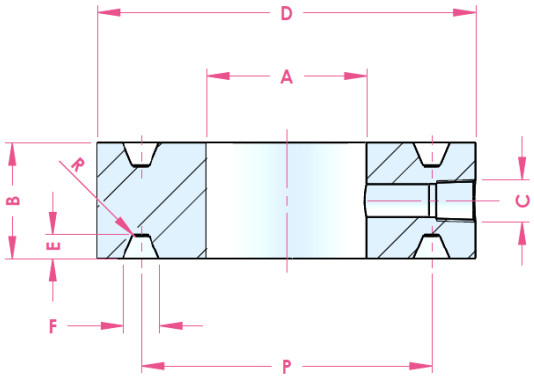
Dimensions table: API ISO 10423



Type 6BX

size	Rating (MPa)	B	D	A	G	N	E	ring	C	R
1-13/16"	69	50.0	105.0	46.0	77.7	11.8	5.6	BX-151	½"	0.8
	103.5		106.0							
	138		117.0							
2-1/16"	69		111.0	53.0	86.2	12.7	5.9	BX-152		
	103.5		114.0							
	138		132.0							
2-9/16"	69		132.0	66.0	102.7	14.1	6.8	BX-153		
	103.5		133.0							
	138		151.0							
3-1/16"	69		152.0	78.0	119.0	15.4	7.5	BX-154		
	103.5		154.0							
	138		171.0							

All dimensions in mm



Type 6B

size	Rating (MPa)	B	D	A	P	F	E	ring	C	R
2-1/16"	13.8	50.0	108.0	53.0	82.6	11.9	7.9	R or RX-23	½"	0.8
	20.7		124.0		95.2			R or RX-24		
	34.5									
2-9/16"	13.8		127.0	66.0	101.6			R or RX-26		
	20.7		137.0		107.9			R or RX-27		
	34.5									
3-1/8"	13.8		146.0	80.0	123.8			R or RX-31		
	20.7		156.0							
	34.5		168.0		136.5			R or RX-35		

All dimensions in mm

Product code ASME Flush Ring

Code										
Example code:		**FR A**	08	A0	RF	S316	2	N12F	OP	-
Standard										
ASME B16.5	A									
Size										
0.75”	1A									
1"	02									
1.5"	04									
2"	05									
3"	08									
4"	10									
Class										
cl. 150 – cl. 2500*1	A0									
cl. 150	A1									
cl. 300	A2									
cl. 400 *2	A3									
cl. 600	A4									
cl. 900*3	A5									
cl. 1500	A6									
cl. 2500	A7									
Facing										
Raised Face◄	RF									
Ring Joint Face	RJF									
Material										
AISI 316(L)◄	S316									
Alloy C276	A276									
AISI 321	S321									
Alloy 400	A400									
Alloy 825	A825									
254 SMO (F44)	DF44									
Duplex (F51)	DF51									
Super Duplex (F53)	SF53									
Duper Duplex (F55)	SF55									
Flush Connection Quantity										
1 side	1									
2 sides◄	2									
Flush connection size										
1/4" NPT	N41F									
1/2" NPT◄	N12F									
3/4" NPT	N34F									
1/2" Butt Weld	B12M									
3/4" Butt Weld	B34M									
1/2" Socket Weld	S12M									
3/4" Socket Weld	S34M									
G ¼ with ISO 1179-4 port connection	G49F									
G ½ with ISO 1179-4 port connection	G29F									
Flush connection mounting										
Open ports◄	OP									
Blind plug	BP									
Vent plug	VP									
BDTV911 needle valve	V911									
Fitting method										
PTFE tape	P									
Grafoil tape	G									
SWAK®	S									
Welded	W									

SWAK® is a trademark of Swagelok
*2: Other facings then B1, fill in facing code from table 1.
*1 For RF flush ring
*2 For size ≥ 4”
*3 For size ≥ 3”

Product code EN Flush Ring

Code										
Example code:		**FR E**	27	D0	B1	S316	2	7	OP	-
Standard										
EN 1092-1	E									
Size										
DN25	24									
DN40	26									
DN50	27									
DN80	29									
DN100	30									
Class										
PN 10 - 400*1	D0									
PN 10-16 *1	D2									
PN 25-400 *1	D9									
Facing*2										
Raised Face◄	B1									
Material										
AISI 316(L)◄	S316									
Alloy C276	A276									
AISI 321	S321									
Alloy 400	A400									
Alloy 825	A825									
254 SMO (F44)	DF44									
Duplex (F51)	DF51									
Super Duplex (F53)	SF53									
Duper Duplex (F55)	SF55									
Flush Connection Quantity										
1 side	1									
2 sides◄	2									
Flush connection size										
1/4" NPT	N41F									
1/2" NPT◄	N12F									
3/4" NPT	N34F									
22mm Butt Weld (1/2")	B12M									
28mm Butt Weld (3/4")	B34M									
1/2" Socket Weld	S12M									
3/4" Socket Weld	S34M									
G ¼ with ISO 1179-4 port connection	G49F									
G ½ with ISO 1179-4 port connection	G29F									
Flush connection mounting										
Open ports◄	OP									
Blind plug	BP									
Vent plug	VP									
BDTV911 needle valve	V911									
Fitting method										
PTFE tape	P									
Grafoil tape	G									
SWAK®	S									
Welded	W									

SWAK® is a trademark of Swagelok
*1: For size ≥DN100
*2: Other facings then B1, fill in facing code from table 1.

Table 1: Additional Facing

Description	code
Large Male Face	LMF
Small Male Face	SMF
Large Tongue Face	LTF
Small Tongue Face	STF
Large Groove Face	LGF
Small Groove Face	SGF
Large Female Face	LFF
Small Female Face	SFF

Description	code
Flat Face	A
Raised face (smooth finish)	B2
Tongue	C
Groove	D
Spigot	E
Recess	F

For the Groove and Tongue Facings the instrument and process and side are the opposites
(eg Instrument side is LTF then Process side is LGF)

Table 2: Options

Option (start options with X_)	code
Cleaned from Oil and Grease	_K1
NACE ISO 15156 (MR 01 75)	_N75
Position 2 mounted valves	_VP2
3.1 material certificate	_IC31
2.1 Pressure leak test certificate standard pressure*1	_LTPS
2.1 Pressure leak test certificate acc PED 2014/68/EU*1	_LTCE
2.1 Penetrant test certificate*2	_PT1
2.2 Positive Material Identification	_PMI
2.2 Welding documents (WPS/PQR)*2	_WPS

*1: For fitted and welded accessory
*2: Only for welded accessory

Table 3: Options

BDTV911 with…	
G 1/4 female connection	BDTV911_G14F
G 3/8" A female connection	BDTV911_G38M
G 1/2 female connection	BDTV911_G12F
1/4" NPT female connection	BDTV911_N14F
1/2" NPT female connection	BDTV911_N12F
3/8" tube Compression fitting	BDTV911_CI38

Authorised Distributor:

NATIONWIDE OIL & GAS

46, Jalan SS 22/21, Damansara Jaya,
47400 Petaling Jaya,
Selangor Darul Ehsan, Malaysia.

Email: nog@nog.com.my
Website: www.nog.com.my

Change log

Date	Change
30-3-2020	1.5” cl 2500 dimension “P” in RJF changed. / Added coding tables ASME and EN
31-3-2020	Coding table extra notes and example changed.
21-9-2020	1.5” cl 2500 dimension “P” in RJF changed from 95.25 to 82.55.
8-12-2020	Removed FF (flat face) as option from flush ring.
15-12-2020	Added ASME ¾” and 1.25” RF flush ring size.
8-3-2021	Dimension tables updated according ASME B16.5:2020
25-8-2021	910 valve changed to 911 valve in Flush Mounting connection
14-10-2021	UNS number and Wst number Ti gr2 correction.