

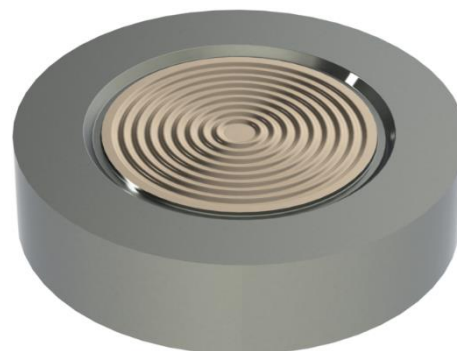
BC type seal – flush diaphragm - Wafer type

Design description

The BC construction has a seal body that is made of bar stock or forged material. The weld of the diaphragm to the seal body is a wetted part and therefore diaphragm materials are mostly chosen the same as the flange material. Its pressure rating is defined by the cover flange and as such it can be used for all pressure ratings in all facings.

Body diaphragm combinations

The diaphragm is TIG-welded to the body and is designed to have the best performance for the specific size. This means that the flexibility and shape is carefully tested and measured. The standard thickness of diaphragm foil is 0.075mm



Seal size, rating and facings - ASME B16.5

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

Seal 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

Seal 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

Seal 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

Body Material	Diaphragm material		
	General name	UNS	Wst.
AISI 316(L)	AISI 316L	S31603	1.4404
	AISI 304L	S30400	1.4306
	AISI 321	S32100	1.4541
	AISI 316 UG	S31603	1.4435
	Alloy C276	N27600	2.4810
AISI 304L	AISI 304L	S30400	1.4306
AISI 310 MoLn	25-22-2 LMN	S31050	1.4466
AISI 316 UG	AISI 316 UG	S31600	1.4435
AISI 321	AISI 321	S32100	1.4541
AISI 904(L)	AISI 904L	N08904	1.4539
Alloy 20	Alloy 20	N08020	2.4660
Alloy 400	Alloy 400	N04400	2.4360
Alloy 600	Alloy 600	N06600	2.4816
Alloy 625	Alloy 625	N06625	2.4856
Alloy 825	Alloy 825	N08825	2.4858
Alloy B2	Alloy B2	N10665	2.4617
Alloy C-22	Alloy C-22	N06022	2.4602
Alloy C-276	Alloy C-276	N10276	2.4810
Duplex F44	254 SMO (6Mo)	S31254	1.4547
Duplex F51/F60	Duplex 2205	S32205	1.4462
Duplex F53	Super Duplex 2507	S32750	1.4410
Duplex F55	Super Duplex 2507	S32750	1.4410
Nickel 201	Nickel 201	N02201	2.4068
Titanium Gr. 2	Titanium Gr. 1	R50250	2.7025
Zirconium 702	Zirconium 702	R60702	-

Gold coatings

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

- 25 µm chemical resistance (diaphragm + facing)
- 40 µm chemical resistance (diaphragm + facing)
- 25 µm Hydrogen protection (diaphragm only)
- 40 µm Hydrogen protection (diaphragm only)

-> See datasheet "Gold coatings"

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
- ECTFE (Halar®) coating
- PFA coating
- FEP coating
- PTFE sheet

-> See datasheet "Polymer solutions"

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), optionally available in in Monel 400. There are three options in ID of the capillary; 2mm, 1mm, and 0.7mm. Badotherm 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 ATEX114 approval to protect against dust and water ingress and possibly corrosive ambient atmosphere.

-> See datasheet "Capillary lines"

Flush rings and flush flanges

Badotherm 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.

-> See datasheet flush rings

-> See datasheet flush flanges

-> See datasheet reducer flanges

Cooling options

There are several ways to protect your instrument from elevated temperatures such as the extended direct mount (EDM), a temperature reducer (TR) or by capillary.

-> See datasheet "cooling devices"

Cover Flange

The BC 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 Badotherm 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 dimensions 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), 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 flanges and seals are marked shop with heat number, material designation, size, and rating. Badotherm adds a Badotherm reference number and the manufacturers name to the flange for traceability purposes.

Flanges and origin

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

Testing

All seals are helium tested according the EN 13185 test procedure A.3 up to 10⁻⁹ mbar l/s before used on a diaphragm seal application.

-> See datasheet "Diaphragm Seal testing"

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 seals 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 diaphragm seals the gasket dimensions are matching the sizes of the EN 1514-2. The size "G" in the tables refer to the start of the gasket surface.

Example performance calculation - Basecal

Whether a diaphragm seal can be used for a specific measurement, depends on the size of the diaphragm. That size is restricted by the size of the diaphragm seal.

For pressure transmitters, Badotherm offers an online performance calculation tool to calculate its performance and to ensure that the diaphragm size is suitable for your measurement.

The table below presents the minimum span of the respective diaphragm sizes with standard process conditions. As rule of thumb, a TPE of max 5% is often considered acceptable, but it depends per situation.

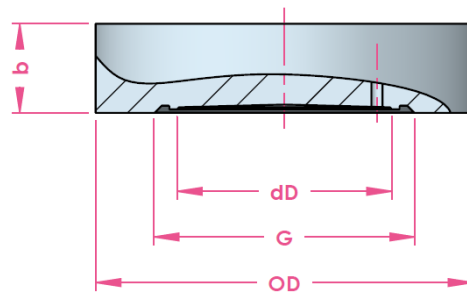
Minimum span table

dD	AP/GP	DP
23.5mm	17.5 bar	na
32mm	11 bar	1850 mbar
44mm	1575 mbar	255 mbar
57mm	415 mbar	70 mbar
72mm	155 mbar	30 mbar
81mm	110 mbar	20 mbar

Pressure transmitter; ambient temperature -10...+30°C; process temperature 100°C with BSO 22 fill fluid; 3 meter capillary; ID 1mm, DP both sides mounted with seal

See the general overview of all diaphragm sizes with several standard situations and in combination with Badotherm pressure gauges.

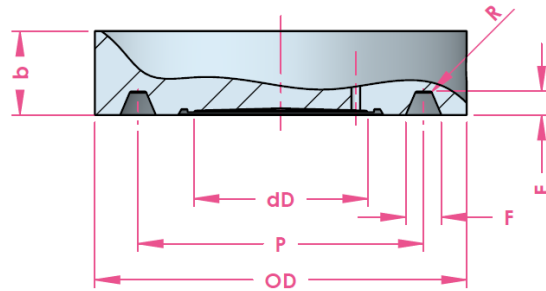
Dimensions table: ASME 16.5 RF facing



size	rating	OD	dD	b	G	weight
1"	cl. 150-2500	50.8	23.0	24.0	31.8	0.4 kg
1.5"	cl. 150-600	73.0	44.0		52.4	0.8 kg
	cl. 900-2500		32.0		41.5	0.8 kg
2"	cl. 150-600	92.1	57.0		70.2	1.3 kg
	cl. 900-2500		44.0		55.4	1.3 kg
3"	cl. 150-2500	127.0	81.0		93.0	2.4 kg
4"	cl. 150-2500	157.2		3.7 kg		

All dimensions in mm

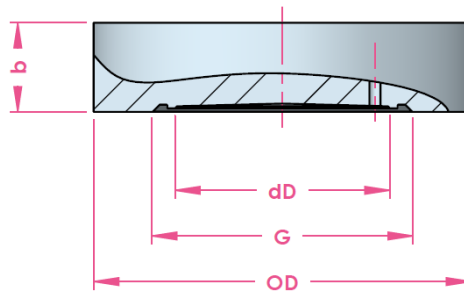
Dimensions table: ASME 16.5 RJF facing



size	rating	OD	dD	b	E	F	P	R	Ring #	weight			
1"	cl. 150	63.5	32.0	28.0	6.35	8.74	47.63	0.8	15	0.7 kg			
	cl. 300	70.0					50.80		16	0.9 kg			
	cl. 400-600	71.5					60.33		18	0.9 kg			
	cl. 900-1500	82.5					57.15		17	0.7 kg			
	cl. 2500	73.0					60.33		18	0.9 kg			
1.25"	cl. 150	79.5	44.0	28.0	7.92	11.91	72.23	0.8	21	1.3 kg			
	cl. 300	81.0					65.07		19	1.3 kg			
	cl. 400-600	82.5					68.27		20	1.4 kg			
	cl. 900-1500	90.5					7.92		11.91	72.23	23	2.3 kg	
1.5"	cl. 150	102.0	57.0	28.0	6.35	8.74	82.55	0.8	22	1.8 kg			
	cl. 300	108.0					95.25		23	2.1 kg			
	cl. 400-600	124.0					101.60		24	2.8 kg			
	cl. 900-1500	133.0					114.30		29	3.1 kg			
	cl. 2500	114.0					7.92		11.91	123.83	31	3.7 kg	
2"	cl. 150	146.0	81.0	30.0	6.35	8.74	136.53	0.8	35	5.0 kg			
	cl. 300	156.0					127.00		32	5.0 kg			
	cl. 400-600	168.0					149.23		37	5.5 kg			
	cl. 900	171.0					161.93		39	7.2 kg			
	cl. 1500	175.0					11.13		16.66	157.18	1.5	38	7.9 kg
3"	cl. 150	171.0	81.0	30.0	7.92	11.91	149.23	0.8	37	5.5 kg			
	cl. 300	175.0					161.93		39	7.2 kg			
	cl. 400	181.0					11.13		16.66	157.18	1.5	38	7.9 kg
	cl. 600	194.0					11.13		16.66	157.18	1.5	38	7.9 kg
	cl. 900	194.0					11.13		16.66	157.18	1.5	38	7.9 kg
4"	cl. 150	203.0	81.0	30.0	7.92	11.91	149.23	0.8	37	5.5 kg			
	cl. 300	175.0					161.93		39	7.2 kg			
	cl. 400	181.0					11.13		16.66	157.18	1.5	38	7.9 kg
	cl. 600	194.0					11.13		16.66	157.18	1.5	38	7.9 kg
	cl. 900	194.0					11.13		16.66	157.18	1.5	38	7.9 kg

All dimensions in mm

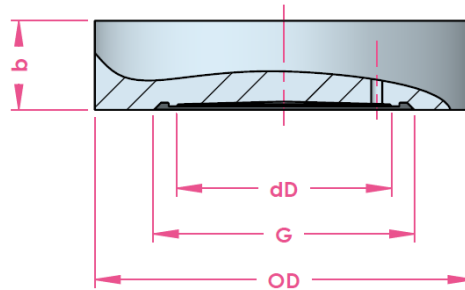
Dimensions table: EN 1092-1 B1 type



size	rating	OD	dD	G	b	weight
DN20	PN10-400	58.0	23.0	33.8	24.0	0.5 kg
DN25		68.0	32.0	41.0		0.7 kg
DN32		78.0	32.0	41.5		0.9 kg
DN40		88.0	44.0	55.4		1.2 kg
DN50		102.0	57.0	70.2		1.5 kg
DN80		138.0	93.0	2.9 kg		
DN100	PN10-16	158.0	81.0	101.0	3.8 kg	
	PN25-400	162.0			3.9 kg	

All dimensions in mm

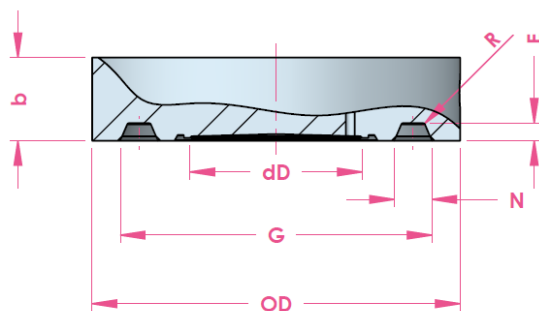
Dimensions table: JIS 2220 RF



size	rating	OD	dD	b	G	weight
25	10K – 20K	67.0	32.0	24.0	40.0	0.7 kg
32	10K – 20K	76.0	44.0		50.6	0.9 kg
40	10K – 20K	81.0	57.0		55.4	1.0 kg
50	10K – 20K	96.0			68.5	1.4 kg
80	10K	126.0	81.0	24.0	93.0	2.4 kg
	16-20K	132.0			2.6 kg	
90	10K	136.0			101.0	3.2 kg
	16-20K	145.0				3.4 kg
100	10K	151.0	3.8 kg			
	16-20K	160.0				

All dimensions in mm

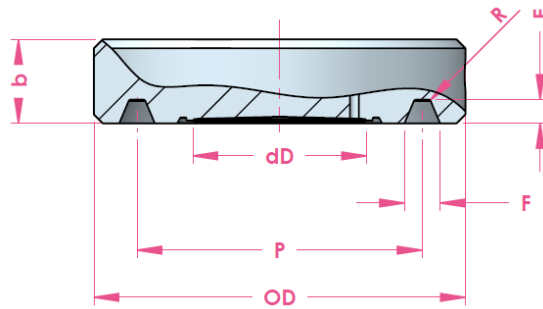
Dimensions table: ISO 10423 – Type 6BX



size	rating	OD	dD	b	E	N	G	ring	Weight
1-13/16"	69MPa	105.0	32.0	28.0	5.6	11.8	77.7	BX-151	1.9 kg
	103,5MPa	106.0							1.9 kg
	138MPa	117.0							2.5 kg
2-1/16"	69MPa	111.0	44.0		5.9	12.7	86.2	BX-152	2.1 kg
	103,5MPa	114.0							2.3 kg
	138MPa	132.0							3.0 kg
2-9/16"	69MPa	132.0	57.0		6.8	14.1	102.7	BX-153	3.0 kg
	103,5MPa	133.0							3.0 kg
	138MPa	151.0							3.9 kg
3-1/16"	69MPa	152.0	72.0	7.5	15.4	119.0	BX-154	3.9 kg	
	103,5MPa	154.0						4.2 kg	
	138MPa	171.0						5.1 kg	

All dimensions in mm

Dimensions table: ISO 10423 – Type 6B



size	rating	OD	b	dD	E	F	P	ring	Weight
2-1/16"	13.8MPa	108.0	28.0	44.0	7.9	11.9	82.6	R or RX-23	2.0 kg
	20.7MPa	124.0					95.2	R or RX-24	2.7 kg
	34.5MPa	127.0					101.6	R or RX-26	2.8 kg
2-9/16"	13.8MPa	127.0	28.0	72.0	7.9	11.9	107.9	R or RX-27	3.3 kg
	20.7MPa	137.0					123.8	R or RX-31	3.7 kg
	34.5MPa	146.0					136.5	R or RX-35	4.2 kg
3-1/8"	13.8MPa	146.0	28.0	81.0	7.9	11.9	136.5	R or RX-35	4.9 kg
	20.7Mpa	156.0							
	34.5MPa	168.0							

All dimensions in mm

Change log

Date	Change
30-3-2020	1.25" added in dimension table RJF. / Decimals added.

Holland – Romania – India – Thailand – Dubai – USA

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