

# EC seal - internal diaphragm threaded type

## Design description

The ECx is a complete welded construction and designed for those applications where the process conditions are such that direct mounting of the instrument cannot be done. Applications are aggressive media, waste water treatment, or when special wetted parts materials for pressure gauges are required. ECx is typically used in combination with pressure gauges



## Housing / diaphragm combinations

Body Material	Diaphragm material		
	General name	UNS	Wst.
AISI 316(L)	AISI 316L	S31603	1.4404
AISI 304L	AISI 304L	S30400	1.4306
AISI 310 MoLn	25-22-2 LMN	S31050	1.4466
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	-

## Process connection

Standard	Female thread	Male thread
ISO 228-1 (BSP)	G ¼ – G 2	G ¼ A – G 1.5 A
ANSI B1.20.1 (NPT)	¼ NPT – 2" NPT	¼" NPT – 1.5" NPT
DIN 13-1 (M)	M20 x 1.5	M20 x 1.5
ISO 7-1 (BSPT)	Rc ¼, Rc ½	R ¼, R ½

## 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 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"

## Cooling options

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

-> See datasheet "cooling devices"

## Testing

All dry 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. More information on diaphragm seal testing can be found in "testing" datasheet.

## Instrument connections

The EC seals are designed to be direct mounted to a pressure gauges or a pressure transmitter. The leading instrument connection for the EC seals is G ½. However for vibrating application that are remoted mounted with a mounting bracket, a capillary a top mounted execution is available.

## 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.

## Flange Marking & Traceability

All flanges 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 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.

## Bore of the connection

Both BSP and NPT male and female thread are having a bore size.  
Depending on the thread size the bore sizes are:

Size	Male	Female
G ¼	6.0 / 3.0*	5.5
G ½	8.0 / 3.2*	7
¼" NPT	6.0	11
½" NPT	10	17

\*for spigot execution

## Maximum working pressure

The EC type seal has a maximum working pressure. Below the MAOP values of the EC in AISI316(L) material.

Type	MAOP @20°C	MAOP @400°C
ECE	600 bar	400 bar
ECB	160 bar	100 bar
ECA	400 bar	200 bar
ECH	1000 bar	700 bar

## Flushing ports

The ECH diaphragm seal is suitable to be equipped with one or two flushing ports. This ports can be left open, or fitted with needle valves, blind plugs or vent plugs. The type and size of the port can be selected within below size.

Size	Standard	Sealant
¼" NPT-f	ANSI B1.20.1	Tape or paste
½" NPT-f	ANSI B1.20.1	Tape or paste
G ¼	ISO 228	gasket ISO 1179
G ½	ISO 228	gasket ISO 1179
½" Socket weld	ASME 16.9	weld
½" Butt weld	ASME 16.11	weld

## Example performance calculation

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.

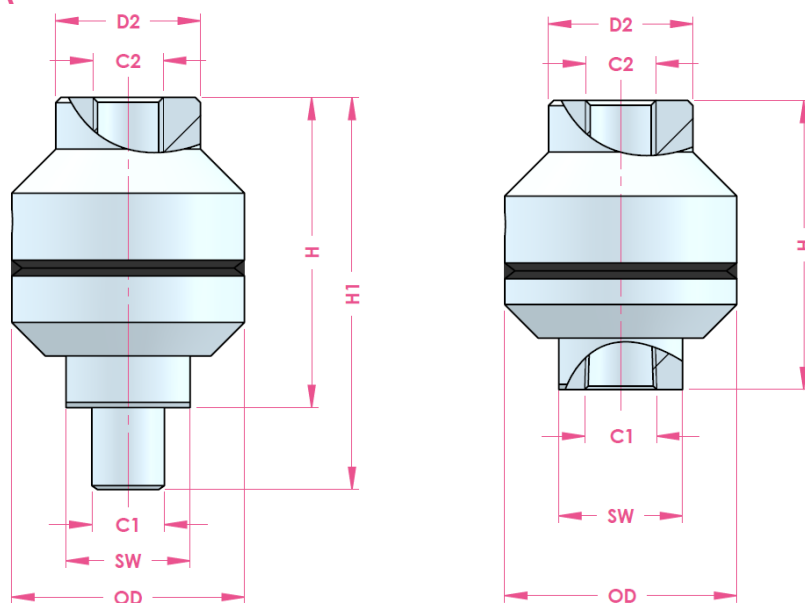
Minimum span table

dD	AP/GP
23.5mm	17.5 bar
32mm	11 bar
35mm	7 bar
50mm	1200 mbar

*Pressure transmitter; ambient temperature -10...+30°C; process temperature 100°C with BSO 22 fill fluid; 3 meter capillary; ID 1mm*

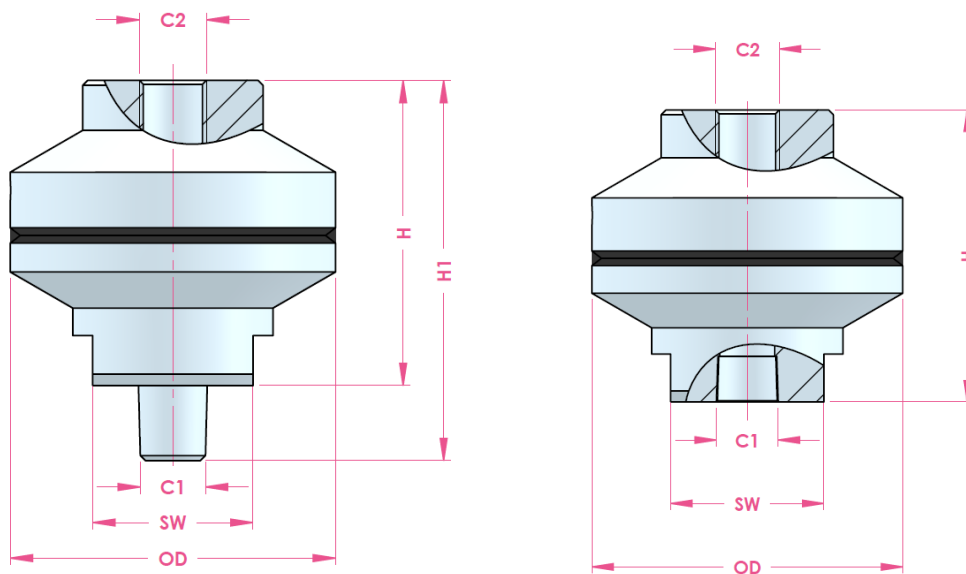
See the general overview of all diaphragm sizes with several standard situations and in combination with Badotherm pressure gauges.

## Dimensions table: ECA



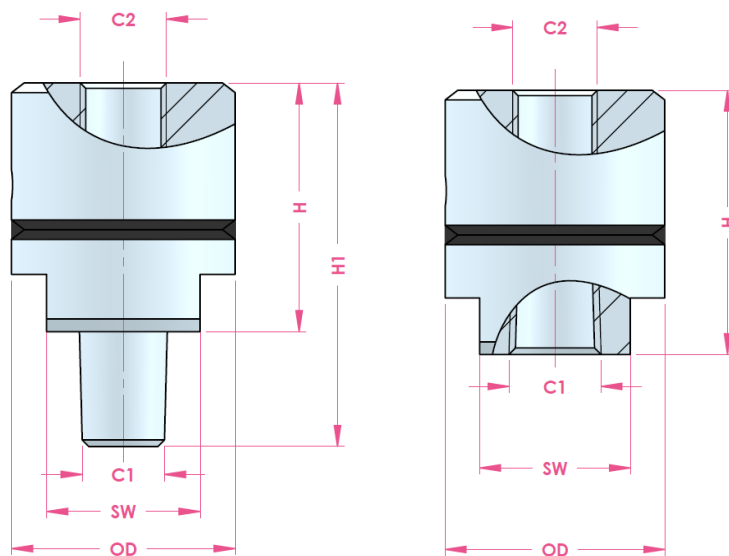
C1	C2	dD	OD	H	H1	SW	Weight
1/2" NPT-f	G 1/2	32.0	45.0	60.0	-	30	<1.0 kg
G 1/2							
1/2" NPT-m							
G ½ A					78.0	24	

## Dimensions table: ECB



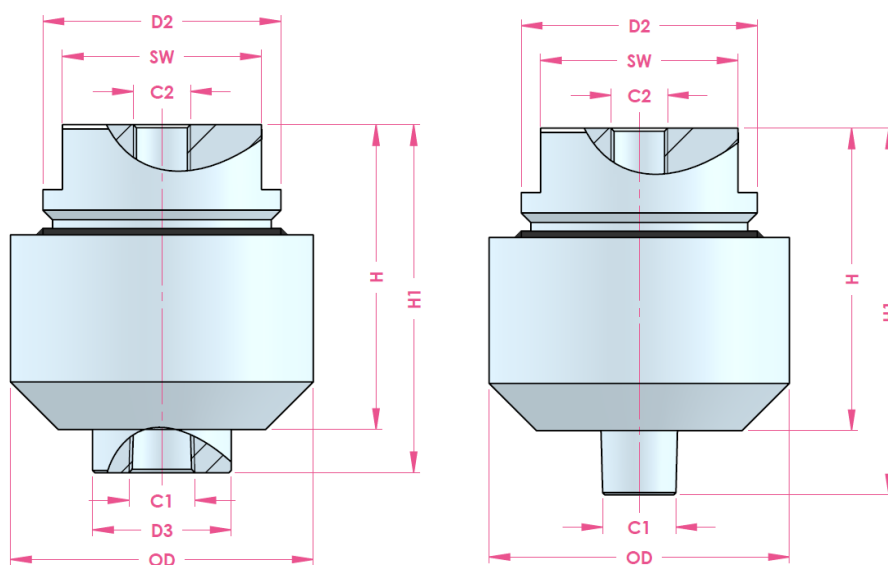
C1	C2	dD	OD	H	H1	SW	Weight
1/2" NPT-f	G 1/2	50.0	65.0	61.0	-	32	<1.5 kg
G 1/2					-		
1/2" NPT-m					81.0		
G 1/2 A					81.0		

## Dimensions table: ECE



C1	C2	dD	OD	H	H1	SW	Weight
1/2" NPT-f	G 1/2	23.5	35.0	49.0	-	28	<0.6 kg
G 1/2					-	28	
1/2" NPT-m					69.0	24	
G 1/2 A					66.0	24	

## Dimensions table: ECH



C1	C2	dD	OD	D2	H	H1	Weight
1/2" NPT-f	G 1/2	35.0	70.0	55	73.0	83	<2.5 kg
G 1/2							
1/2" NPT-m					69.0	89.0	
G ½ A							

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