



AG1-BC BUTTERFLY VALVE



ANGODOS
Válvulas

"From 1970 close to our clients"



ANGODOS

Since 1970 **ANGODOS** has been technological leader in valves industry, manufacturing everything in Madrid (Spain) and commercializing high performance valves internationally for different application fields.

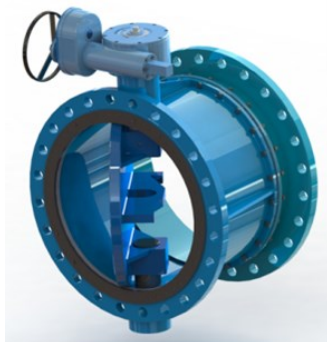
ANGODOS Manufacturing range is pretty wide, covering a variety of application for different fields as waste water, drinking water, desalination, sanitation, irrigation system, mining, industry, gas and petroleum. from PN6 to PN100 and from DN40 to DN3000.

Since the creation of **ANGODOS**, the main objective has been providing Taylor-made solutions for the customers, developing a wide range of butterfly valves with different construction types and actuators, overspeed valves, check valves, air valves, and discharge valves solutions as howell-bunger valves.

Constant innovation and technological development allows **ANGODOS** to be the reference for the professionals interested in quality, safety, ease of use and installation and of course durability. **ANGODOS** has established a quality system for valves manufacturing, which has been approved by Lloyd's Register in accordance with the quality management system standard ISO 9001.



ANGODOS valve AG1 DN900 PN100



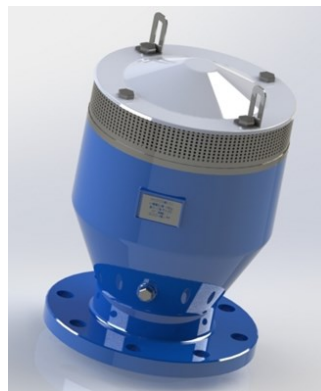
ANGODOS valve model AG1-CT with dismantling joint



Overspeed valve DN2000 PN25, double arm



Interior plant view – big diameter valves



DN150 PN25 air release valve



Check valves DN900 PN16 with hydraulic shock absorber

Certificates

 Lloyd's Register LRQA

CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

ANGODOS, S.L.
C/ San Juan, 21-23
Pol. Ind. El Palomo
28946 Fuenlabrada, Madrid
Spain

has been approved by Lloyd's Register Quality Assurance to the following Quality Management System Standard:

ISO 9001:2008

The Quality Management System is applicable to:

Design, manufacturing, sales, starting-up, maintenance and after sales services of butterfly valves. Manufacturing and sale of spare parts and hydraulics and mechanical systems drive for butterfly valves.

Approval Certificate No: SGI 2199125	Original Approval: 01 July 1999
	Current Certificate: 01 December 2015
	Certificate Expiry: 14 September 2018



Issued by: LRQA España, S.L.
 For and on behalf of: Lloyd's Register Quality Assurance Limited



C/ Princesa, 25 - 1^o - 28008 Madrid, España
 For and on behalf of: 1 Trinity Park, Bicester, Oxon, OX1 1YF, United Kingdom
 This approval is issued in accordance with the ISO 9001:2008 standard and is subject to the terms and conditions of the contract.
 The use of the UKAS Accredited Mark indicates Accreditation to ISO 9001:2008

ISO 9001

 Lloyd's Register

EC Certificate of Conformity
In accordance with the requirements of the Pressure Equipment Directive 97/23/EC

This is to certify that the Quality Management System of:

ANGODOS, S.L.
C/San Juan nº 21/23
28946 - Fuenlabrada (Madrid)
SPAIN

has been assessed against the requirements of Annex II, Module H of the Pressure Equipment Directive 97/23/EC, and conforms to the requirements for the products shown below:

Design and production of butterfly valves
 (see attached schedule)

Approval is subject to the continued maintenance of the quality system in accordance with the requirements of the above Directive.

Authorisation is hereby given to use the LRV Notified Body Identification Number in accordance with the requirements of the specified Directive in relation to the products as identified above.

Certificate No:	0038/PED/MAD/0140
Original Approval:	31 January 2014
Current Certificate:	23 January 2015
Certificate Expiry:	30 January 2017


LRV Notified Body Number 0038



Issued by: Lloyd's Register Verification Limited
 For and on behalf of: Lloyd's Register Verification

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PRESSURE EQUIPMENT 97/23/EC

 Lloyd's Register

EC Certificate of Conformity
Certificate 0038/PED/MAD/0140 Schedule
In accordance with the requirements of the Pressure Equipment Directive 97/23/EC

ANGODOS, S.L.
C/San Juan nº 21/23
28946 - Fuenlabrada (Madrid)
Spain

Product(s)
Butterfly valves

Type WAFER (AG1)
 Nominal diameters from DN50 to DN600 / Nominal pressures PN10, PN16, PN25 and PN40
 Body materials: Ductile iron, carbon steel, stainless steel.
 Butterfly materials: Carbon steel, stainless steel.


Type LUG (AG1)
 Nominal diameters from DN100 to DN150 / Nominal pressures PN10, PN16, PN25 and PN40
 Body materials: Ductile iron, carbon steel, stainless steel.
 Butterfly materials: Carbon steel, stainless steel.

Type SHORT FLANGES (AG1)
 Nominal diameters from DN200 to DN600 / Nominal pressures PN10, PN16, PN25 and PN40
 Body materials: Ductile iron, carbon steel, stainless steel.
 Butterfly materials: Carbon steel, stainless steel.

Type LARGE FLANGES (AG1-BC)
 Nominal diameters from DN200 to DN1200 / Nominal pressures PN10, PN16 and PN25
 Body materials: Ductile iron, carbon steel, stainless steel.
 Butterfly materials: Carbon steel, stainless steel.

Type LARGE FLANGES (AG1-VC)
 Nominal diameters from DN100 to DN300 / Nominal pressures PN10, PN16 and PN25
 Body materials: Ductile iron, carbon steel, stainless steel.
 Butterfly materials: Carbon steel, stainless steel.

Schedule Issue:	02
Date of Schedule Issue:	23 January 2015
LRV Notified Body Number 0038	




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CERTIFICATE 0038/PED/MAD70140

AENOR Product Certificate
Isolating valves for water supply



B18/000006

AENOR, Spanish Association for Standardization and Certification, certifies that the organization

ANGODOS, S.L.

registered office: C/ San Juan nº 21-23, Polígono Industrial El Palomo 28946 Fuenlabrada (Madrid - España)

supplies: Isolating valves for water supply

In compliance with: UNE-EN 1074-1:2001 (EN 1074-1:2000)
 UNE-EN 1074-1:2001 ERRATUM:2008
 UNE-EN 1074-2(A):2004 (EN 1074-2:2000)(A1:2004)
 UNE-EN 1074-2:2001 (EN 1074-2:2000)


References: Specified in Annex to the Certificate

Production site: C/ San Juan nº 21-23, Polígono Industrial El Palomo 28946 Fuenlabrada (Madrid - España)

Certification scheme: In order to grant this Certificate, AENOR has tested the product and has verified the quality system implemented for its manufacture. AENOR performs these tasks periodically while the Certificate has not been cancelled, in accordance with Specific Rules RP B18.01

This certificate supersedes B18/000006, dated 2014-04-07

First issued on:	2014-04-07
Modified on:	2014-07-23
Validity date:	2019-04-07



Avelino BRITO
 [Signature] Executive Officer

AENOR Asociación Española de Normalización y Certificación | Gran Vía 1, 150M Madrid, España | Tel. 902 102 101 - www.aenor.es

1074-1 1074-2 PRODUCT CERTIFICATE

Epoxy coating system

Epoxy Powder is the standard coating material for **ANGODOS** valves. This coating guarantees high corrosion and abrasion resistance while shows outstanding impact resistance. Also excellent bonding with ductile iron is ensured for long service life without servicing the valves.

Application process

ANGODOS Just applies the best epoxy powder, and always following the procedures carefully to ensure the quality and maintain the properties of the coating.

The process comprises four steps:

- Pre-Blasting cleaning of the element.
- Blasting grade SA 2 1/2 according to UNE-EN-ISO 8503 "Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates".
- Heating elements to 180°C.
- Electrostatic spray is applied assuring 300 microns thick creating a polymerized, continue, and airtight film all over the valve.

Coating performance

- Perfect airtight, zero porosity.
- Minimum coated thickness 300 microns.
- High adhesion to metal (min. 12 N/mm²).
- High resilience never cracking.
- Smooth surface (makes incrustation more difficult).
- Suitable for drinking water and food use. WRAS certificate.



Manual blasting cabin 4.5x4.5 meters



Polymerization ovens, 3x3x5 meters



Manual powder coating, cabin 4x4 meters

Polyurethane coating system

Polyurethane (PU) coating is an optional coating material for all **ANGODOS** valves. This coating guarantees high corrosion and abrasion resistance while having more flexibility than epoxy coating higher impact resistance. Also excellent bonding with ductile iron is ensured for long service life without servicing the valves. Polyurethane coating shows outstanding wear resistance and the advantage of being U.V stable, this means that it won't yellow like epoxy does when exposed to small amounts of sunlight over a period of time

Application process

ANGODOS Just applies the best polyurethane and always following the procedures carefully to ensure the quality and maintain the properties of the coating.

The process comprises three steps:

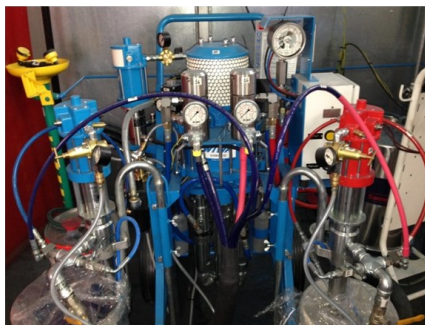
- Pre-Blasting cleaning of the element.
- Blasting grade SA 2 1/2 according to UNE-EN-ISO 8503 "Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates".
- Polyurethane is applied assuring minimum 300 microns thick creating a polymerized, continue, and airtight film all over the valve, but the thickness could be up to 1000 microns.

Coating performance

- Perfect airtight, zero porosity.
- Minimum coated thickness 300 microns but can reach 1000 microns as desired.
- Very good adhesion to metal (min. 10 N/mm²).
- High resilience never cracking, very flexible, tolerates large temperatures swing.
- High scratch resistance.
- Smooth surface (makes incrustation more difficult).
- Suitable for drinking water and food use. WRAS certificate.



Manual blasting cabin 4.5x4.5 meters



Equipment for corrosion protection with polyurethane coating



Manual powder coating, cabin 4x4 meters

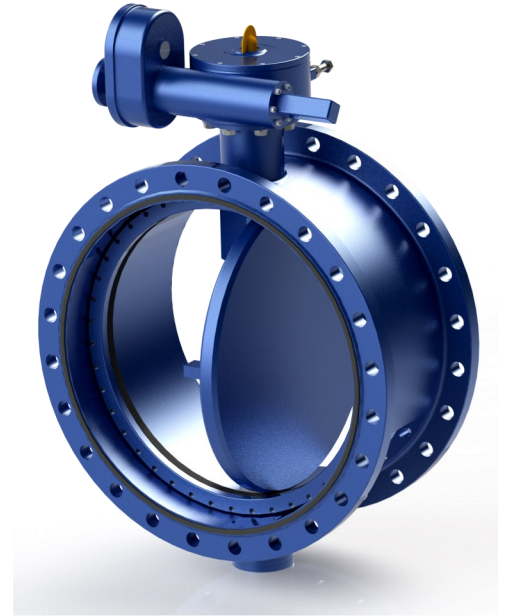


Butterfly valve

ANGODOS AG1-BC is a full bore butterfly valve with flanged body. The valve is manufactured from a single cast iron body (up to DN1600) or mechanical welded body (from DN700 to DN2000).

The sealing gasket is the key for reliable sealing performance and it's placed in the body. The disc is attached to the eccentric (simple or double) shaft bearing assuring an uniform seat and avoiding critical leaking by pressure discontinuities at the sealing area. In this way **ANGODOS AG1-BC** sealing system assures perfect sealing under the most demanding conditions.

Full bore and hydrodynamic internal design provides outstanding hydrodynamic features minimizing the head loss.



Product features

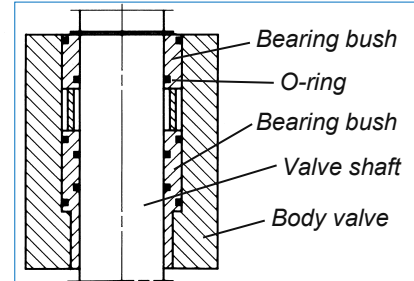
- UNE-EN 1074-1 / UNE-EN 1074-2 Product certificate.
- Full bore.
- Minimum head loss.
- Low maintenance due to robust, simple and compact design.
- Made with top quality materials, certified for drinking water and highly corrosion resistant.
- Easy elastomers replacement.
- Flat lateral gaskets included, body embedded for easy installation.
- Flange connection according to UNE-EN 1092.
- Face to face dimensions series 13 and 14 according to UNE-EN 558.
- Simple or double eccentricity.
- Low friction and maintenance free bearing system.
- Locking system on the shaft, no need to cut off the fluid flow for gearbox maintenance works (optional).
- Gearbox: smooth drive, IP67rating, standard motor connection, self-locking, adjustable stop, position indicator.
- Easy installation due to the lifting attachments and compact size.
- Wide manufacture range, DN200-DN2000 / PN10, PN16, PN25.
- Optimum performance in clean water and reused water systems up to 60°C.
- Special materials available upon request.
- Other dimensions available upon request.



Design principles

Bearing system

The stainless steel shafts are completely enclosed by using O-ring sealing embedded inside and outside the bronze bearing bush internally and externally. Bronze material has self-lubricating properties, additionally while mounting the system bearings are lubricated using silicone grease, getting low friction in the system, allowing smooth operation and long and safe service life.

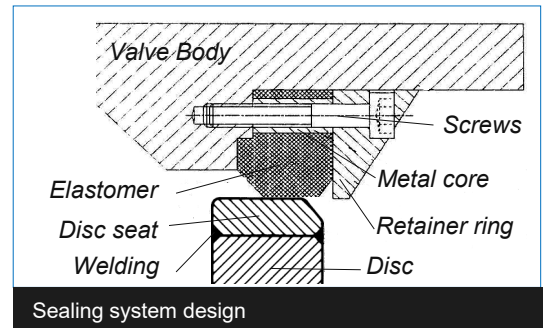


Bearing system design

Sealing system

The system consists of an elastomer (EPDM) gasket vulcanized to a metal core which is placed in the body using a retainer disk and screws. The sealing system is easily replaceable. Sealing seat in the disk is made of stainless steel for better sealing and longer life of the elastomer.

The cylindrical-conical shape of the sealing system makes ANGODOS AG1-BC valve suitable for working pressures up to 30 bar.



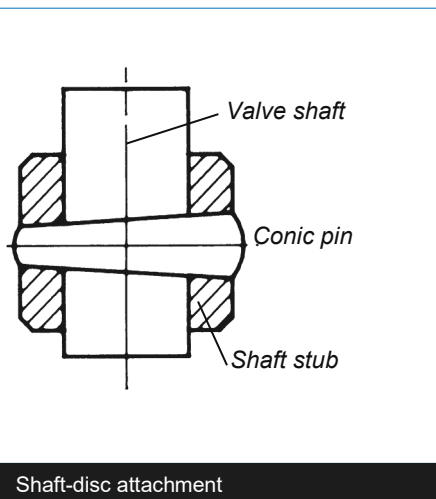
Sealing system design

Shaft system

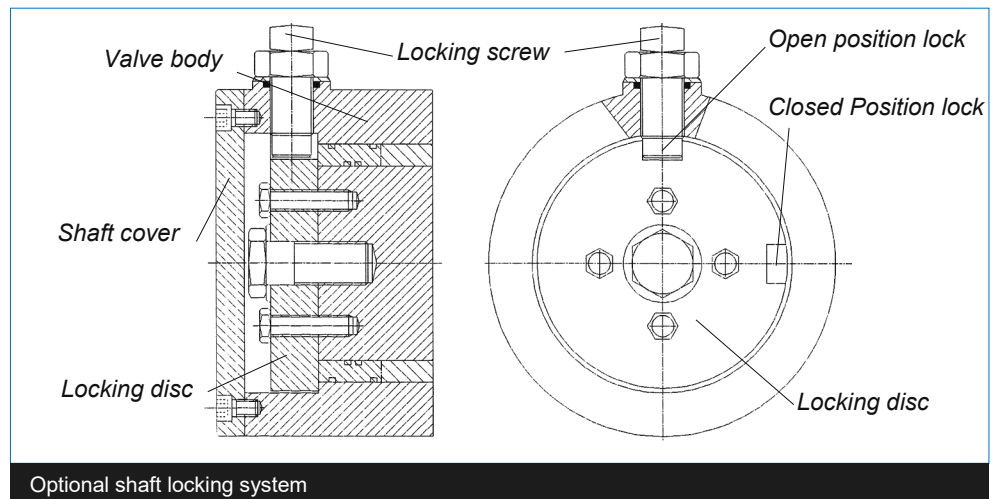
The drive shaft is attached to the using conic pins during the assembly operation, avoiding any kind of displacement. The actuator is attached to the shaft according to ISO 5211 standard.

Optionally a locking system can be mounted on the fixing shaft, enabling to lock the valve on open or closed position, no need to cut off the fluid flow for gearbox maintenance works.

ANGODOS AG1-BC is manufactured taking care of the operation conditions and client requirements, the design range includes simple (34mm-150mm according to DN) or double eccentricity (1mm-3mm) shaft, with bidirectional sealing.



Shaft-disc attachment



Optional shaft locking system

Hydraulic performance

ANGODOS AG1-BC has been designed to maximize the hydraulic performance. To this end full bore has been ensured and the hydrodynamic design of the valve (interior shape of the body, shaft and disc) minimize head loss

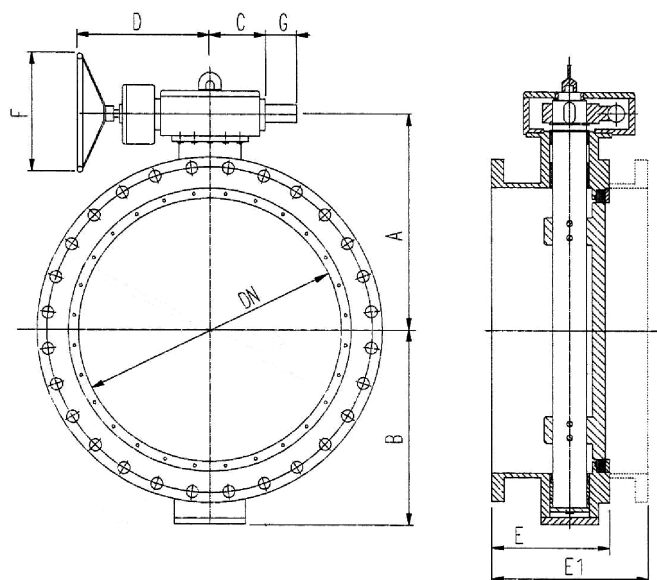
A powerful tool (CFD) has been used to ensure the best valve design and to calculate the air performance (CFD).

Flow coefficient **Kv** is defined as the flow rate in cubic meters per hour [m³/h] of water with a pressure drop across the valve of 1 bar. Flow coefficient will drop as the degree of valve opening **Kv(α)**.

DN	200	250	300	350	400	450	500	600	700	800	900	1,000	1,200	1,400	1,600	1,800	2,000
Kv (100)	1,552	2,788	3,847	6,052	7,458	9,486	11,665	23,500	29,907	46,216	50,873	65,462	104,673	134,440	176,879	226,833	281,023
Kv (75)	1,152	1,764	2,592	3,996	4,968	7,848	8,244	14,040	19,188	26,352	29,808	41,112	61,128	89,244	77,148	163,152	227,952
Kv (50)	468	792	1,152	1,692	2,304	3,024	3,924	5,760	8,676	11,340	14,688	20,160	29,052	39,132	51,084	64,656	79,848
Kv (25)	144	252	360	504	720	936	1,188	1,764	2,664	3,456	4,464	6,156	8,856	11,916	15,588	19,728	24,336

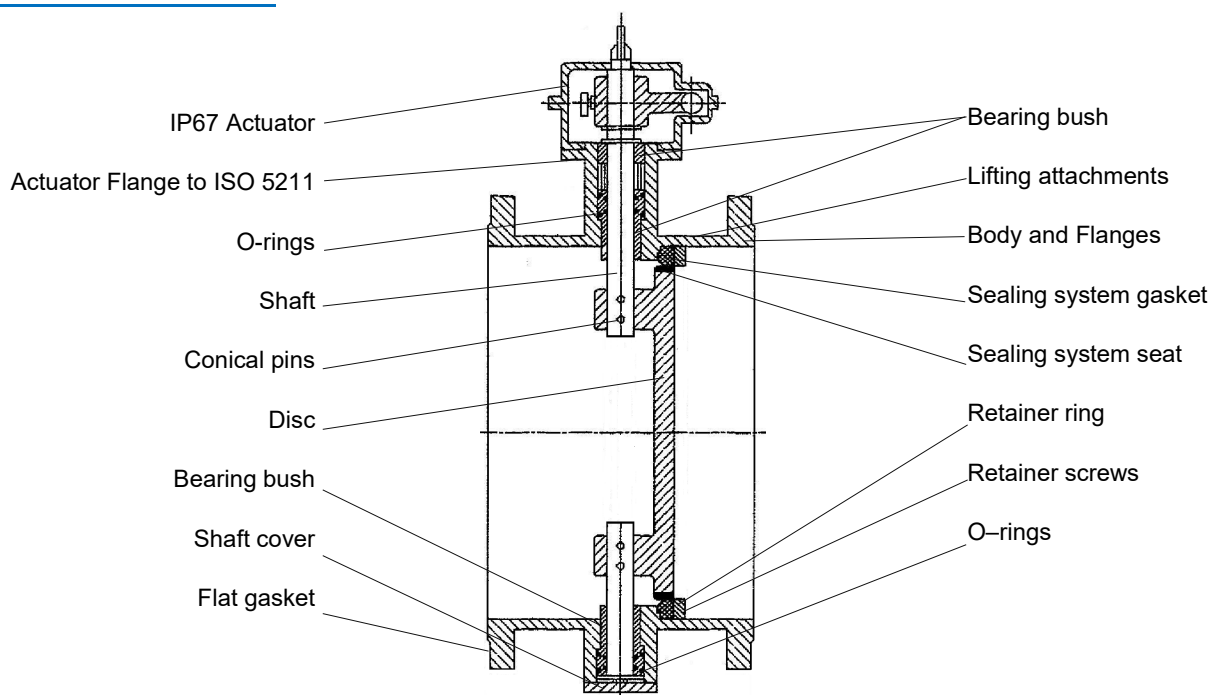
Dimensional characteristics

DN	A (mm)	B (mm)	C (mm)	D (mm)	UNE-EN 558 S13	UNE-EN 558 S14	F (mm)
					E (mm)	E1 (mm)	
200	265	180	95	200	-	230	210
250	310	230	95	200	-	250	210
300	335	300	95	200	-	270	300
350	365	320	95	200	-	290	300
400	405	340	95	200	-	310	300
450	430	390	120	260	-	330	300
500	580	420	120	260	-	350	300
600	640	465	170	290	-	390	400
700	620	547	245	320	292	430	500
800	660	590	245	400	318	470	500
900	720	650	340	500	330	510	500
1000	790	700	340	500	410	550	500
1200	940	830	340	500	470	630	500
1400	1,150	980	520	550	530	710	450
1600	1,320	1,130	520	550	600	790	450
1800	1,400	1,325	550	600	650	850	450
2000	1,515	1,370	550	600	725	910	450



- Flanges PN10, PN16, PN25 to UNE-EN 1092, ISO 2531 .
- Face to face length according to UNE-EN 558, ISO 5752.
- Other dimensions available upon request.

Parts list and materials



Component		Material
1	Body and flanges	DN200-DN1600 Ductile cast iron GJS-400-15 according to UNE-EN 1563 (ASTM A536 GR.65-45-12) + 250µ Epoxy
		DN700-DN2000 Steel S275JR according to UNE-EN 10025-2 (ASTM A36) + 250µ Epoxy
2	Disc	Ductile cast iron GJS-400-15 according to UNE-EN 1563 (ASTM A536 GR.65-45-12) + 250µ Epoxy
		Steel S275JR according to UNE-EN 10025-2 (ASTM A36) + 250µ Epoxy
3	Sealing system disc seat	Stainless Steel 1.4301 according to UNE-EN 10088-1 (AISI 304)
4	Shaft	Stainless Steel 1.4021 according to UNE-EN 10088-1 (AISI 420)
5	Conical pins	Stainless Steel 1.4021 according to UNE-EN 10088-1 (AISI 420)
6	Sealing system gasket	Elastomer EPDM 70 Shore according to UNE-EN 681-1
7	Retainer ring	Steel S275JR according to UNE-EN 10025-2 (ASTM A36) + 250µ Epoxy
8	Retainer screws	Stainless Steel 1.4301 according to UNE-EN 10088-1 (AISI 304)
9	Bearing bush	Bronze CC491K according to UNE-EN 1982 (ASTM B62 C83600)
10	O-rings	Elastomer EPDM 70 Shore according to UNE-EN 681-1
11	Lifting attachments	Forged steel
12	Shaft cover	Steel S275JR according to UNE-EN 10025-2 (ASTM A36) + 250µ Epoxy
13	Flat gasket, flange embedded	Elastomer EPDM 70 Shore according to UNE-EN 681.1
14	External screws	Stainless Steel 1.4301 according to UNE-EN 10088-1 (AISI 304)

- Body: Cast Stainless Steel (AISI 316) / ductile cast iron + vulcanized elastomer.
- Disc: Stainless Steel (AISI 316)/ Duplex / Bronze.
- Coating: Protegol PU 32-45.
- Bearing bush: Teflon covered carbon Steel.