



# ADDENSEO®

international GmbH

[www.ADDENSEO.com](http://www.ADDENSEO.com)



## Mechanical Seals For

Oil & Gas • Refinery • Petrochemical • Chemical • Power  
Fertiliser • Pharmaceutical • Paper • Aerospace • Marine

## About The Company

### Environmental, Health & Safety

ADDENSEO management and employees take active participation in establishing and supporting Environmental, Health and Safety (EHS) policy and procedures. By maintaining compliance with applicable EHS laws and regulations ADDENSEO strives to ensure the health, safety, and welfare of its employees and others affected by its business operations.

### State-of-the-art production

Each and every ADDENSEO seal is the result of numerous steps involving raw material procurement and thus processing the same in various production steps. Manufacturing high quality sealing systems is all down to exceptional precision, which in turn calls for exact, consistent compliance with the strictest of production standards. ADDENSEO has consistently invested in state-of-the-art machinery for delivering world class products to its customers.

### Quality takes center stage

Quality is always a priority at ADDENSEO. In response to the growing needs of our customers, ADDENSEO management is committed to the investment and implementation of various international standards on Quality as well as Environmental Management Systems.

## About us

ADDENSEO designs and manufactures seals and associated products mainly for the oil & gas, chemical, pharmaceutical, pulp & paper, power, mining and many more industrial applications. Today, it provides the most complete selection of engineered mechanical seals and sealing support systems. ADDENSEO products are globally recognized as a trusted brand in the process industry.

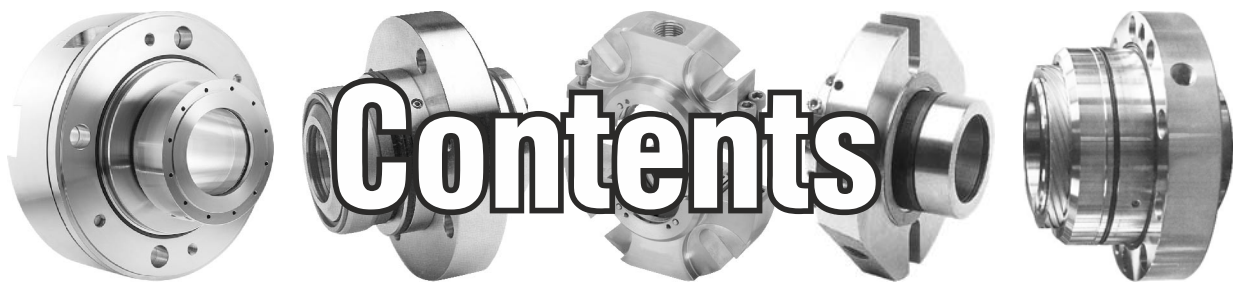
ADDENSEO can help relieve stress and reduce the life cycle costs associated with the most important aspects of plant operation. Dedicated to delivering the highest quality support, ADDENSEO services and solutions integrates hydraulic, mechanical and materials engineering knowledge with creative solutions. It improves equipment reliability and system performance, reduces energy consumption and improves the safety and environmental impact of operations.

ADDENSEO has a long standing tradition of providing seals and sealing services that are trusted by the industry. ADDENSEO mechanical seals represent a collection of trusted products that are supported by strong after market services, providing users with both safety and environmental benefits.

ADDENSEO seals are used on a variety of rotating equipment, including pumps, compressors, mixers, steam turbines and other specialty equipment, primarily in the oil and gas, pharmaceutical, chemical processing, mineral and ore processing and general industries.

ADDENSEO products guarantee highest quality standards & application know-how with full service to its customers.





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The specifications, drawings, images etc included in this catalogue are intended to be generic and must be interpreted as equivalent or functionally equivalent. The identification of many items is facilitated by illustrations (photographs and general assembly drawings) and mention of, or reference to any specific standards, or trade names, including those that might appear on the photographs, drawings, images etc is intended for illustration purposes only, and does not imply an endorsement or imitation or preference of any specific standard, brand, manufacturer or supplier. Neither does the information imply the availability of any mentioned items. The items discussed alongwith the images, drawings etc portrayed are representative of industry catalogues, standards, terminology and specifications hence, accounting for any resemblance which otherwise may be co-incident.

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ADDENSEO is continuously improving and upgrading their products with respect to quality and application and therefore any changes made to the catalogue may be made without any notice.

# Industrial Applications

## Onshore



To be able to cope with sand, water and gases found in crude oil, pumping systems for mineral oil require heavy duty pumps with reliable engineered mechanical seals that feature durable sliding faces with good emergency running characteristics. Often it is necessary to seal pressures in excess of 100 bar and sliding velocities of over 60 m/s. The ideal seal face combination for such conditions have proven to be high-strength carbons running against silicon carbide.

### Typical Applications

- Crude Oil Pump
- Pipeline Pump
- Water Injection Pump

## Offshore



Adverse environmental conditions, high rotational speed and pressure levels as well as corrosive media constituents place demanding requirements on sealing technology used in the offshore production and subsequent conveyance of oil and gas. Not only that but in many cases highly abrasive mixtures of crude oil, water, gas and sand cause a high degree of wear. ADDENSEO has proven itself with its heavy-duty mechanical seals with innovative and tailor made seal components with high-strength seal faces, guaranteeing longer service life even in highly stressed pumps.

### Typical Applications

- Main Oil Export Pump
- Multiphase Pump
- Water Injection Pump

## Compressors



High speed machines whose trouble free availability constitutes a major precondition for many process engineering operations. Key criteria for the selection and design of compressors are the working medium, the compression ratio, the volume flow, the number of intermediate inputs & outputs and the design of the shaft seal which assumes critical importance.

### Typical Applications

- Ammonia Compressor
- CO Compressor
- Oven Gas Compressor
- Ethylene Compressor
- Flash Turbine
- Screw Compressor

## Quarrying & Coal Mining



The cutter heads on quarrying and mining machines are fed with water, not only for cooling purposes but also for settling the dust and extinguishing any sparks produced by the cutting tools. Mechanical Seals perform the dual function of a rotary joint and a seal for the cutter and roller heads. Sealing systems used on these equipment are exposed to abrasive and chemically aggressive media. In some applications, high temperature and pressure make conditions even more challenging. Despite the harsh operating environment, users expect high reliability to avoid costly downtime.

### Typical Applications

- Cutter Head Seal
- Mining Machine
- Roller Head Seal
- Rotary Joint For Carbide Cutter

## Coal Gasification



There were times, particularly during the oil-crisis years, when coal gasification centered on the process of hydrogenation, e.g. to produce motor fuels. Nowadays the driving force behind its further development is the generation of electricity by combination-type power stations with integrated coal gasification. Here the main objectives are to lower CO<sub>2</sub> emissions, to raise fuel efficiency and to stretch existing resources.

### Typical Applications

- Coal Feed Screw

## Chemical & Petrochemical



The materials used in the chemical/petrochemical industry need to be capable of coping with the large array of media, many of them explosive or toxic and others which could become when mixed. An increased awareness of environmental risks calls for a maximum reliability and operational safety, especially from sealing systems. Against this background, the sealing systems used in applications involving what are in many cases explosive, toxic or aggressive media have to ensure optimum tightness. On the other hand they should also help optimize processes and thus be of advantage where the economic aspects are concerned as well. From non-critical sealing points – for which standard solutions are deployed – right through to highly complex system solutions required where particularly difficult operating conditions are concerned.

### Typical Applications

- Agitator Bead Mill
- Chemical Pump
- Eccentric Screw Pump
- Gear Pump
- Glass Lined Reactor
- Thin Film Evaporator
- Centrifuge
- Chemical Reactor

# Industrial Applications

## Refinery



The processing of crude oil in refineries is a complex and multi-stage process in which crude oil is transformed into refined, high-quality end products or feed materials for petrochemical industry. Sealing technology for such diverse applications have to meet challenges in various respects; risk of insufficient lubrication and dry running, media with a diversity of physical properties, high and low temperature ranges and the handling of hazardous substances and all other conditions which need to be controlled with absolute reliability. With a comprehensive range of API-compliant quality seals and supply systems, ADDENSEO is playing a key role towards ensuring the reliability and safety of refinery processes.

### Typical Applications

- Discharge Pump
- Gas Oil Pump
- GLP Delivery Pump
- Quench Oil Pump
- Residual Oil Pump

## Sugar



Sugar campaigns are over in a relatively short time. For optimum economy and ecology it is all the more important, therefore to have a reliable sealing systems. In the past it was normal for juice pumps to be equipped with double seals to cope with the tendency to crystallization and carbonation. Today the use of single seals is possible in most of the cases due to availability of modern materials and new seal compartment geometries.

### Typical Applications

- Flume Water Pump
- Juice Circulating Pump
- Worm Agitator
- Mash Pump

## Pharmaceutical



In addition to meeting technical requirements a seal has to display many other characteristics in connection with cleanliness, health and general legislation. These include for example materials which are compatible with food, smooth and abrasion-proof surfaces which are easy to clean, complete units which can be sterilized and cleaned without having to be dismantled (SIP/CIP). ADDENSEO mechanical seals have been used for such demanding applications with great success in sterile processes. Our range of mechanical seals includes a broad spectrum of high-quality, specifically optimized sealing solutions ranging from standard solutions to specialized system solutions for nearly any application in the pharmaceutical industry.

### Typical Applications

- Agglomerator
- Spherical Dryer
- Eccentric Pump
- Sterile Pump
- Centrifugal Pump
- Filter Dryer
- Food Pump

## Power



Sealing systems featuring maximum operational reliability, convenient maintenance and low leakage rates with necessary environmental protective measures are standard requirements in modern power stations. The product range includes mechanical seals and supply systems for auxiliary and secondary pumps, boiler circulation pumps and feedwater pumps as well as mechanical seals and carbon floating ring seals for turbines, compressors and fans.

### Typical Applications

- Boiler Circulating Pump
- Feed Pump
- Flue Gas Desulphurisation
- Residue Evacuation Pump
- Condensate Pump

## Pulp & Paper

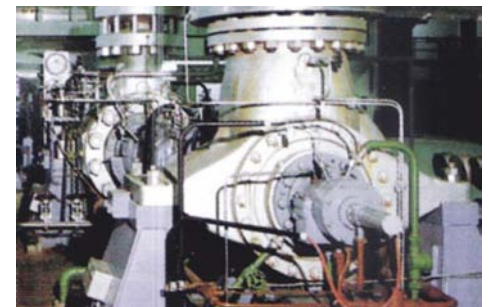


Wood is the most important raw material for the pulp and paper industry. It is either digested to chemical pulp in digesters or reduced to mechanical pulp in grinders or refiners. The pulp produced this way is then graded, bleached and washed and conveyed to the paper machine. There it passes through the various stages such as head box, wire part, press section, drying section and reeling section.

### Typical Applications

- Pressure Grinder
- Pulp Pump
- Digesting & Bleaching Pump
- Deinking Pump

## Hot water



Hot water is conveyed by pumps for a variety of purposes in thermal energy generating systems, district heating systems, home heating systems and so on. The suitability of a mechanical seal for such applications depends on many different parameters, e.g. pressure to be sealed, temperature at the seal, sliding velocity, power consumption, water quality (pH-value, O<sub>2</sub>-dose, conductivity, operating mode), water additives such as corrosion inhibitors etc.

# CSX ANSI Single Seals Mechanical Seals for Pumps · Standard Cartridge Seals

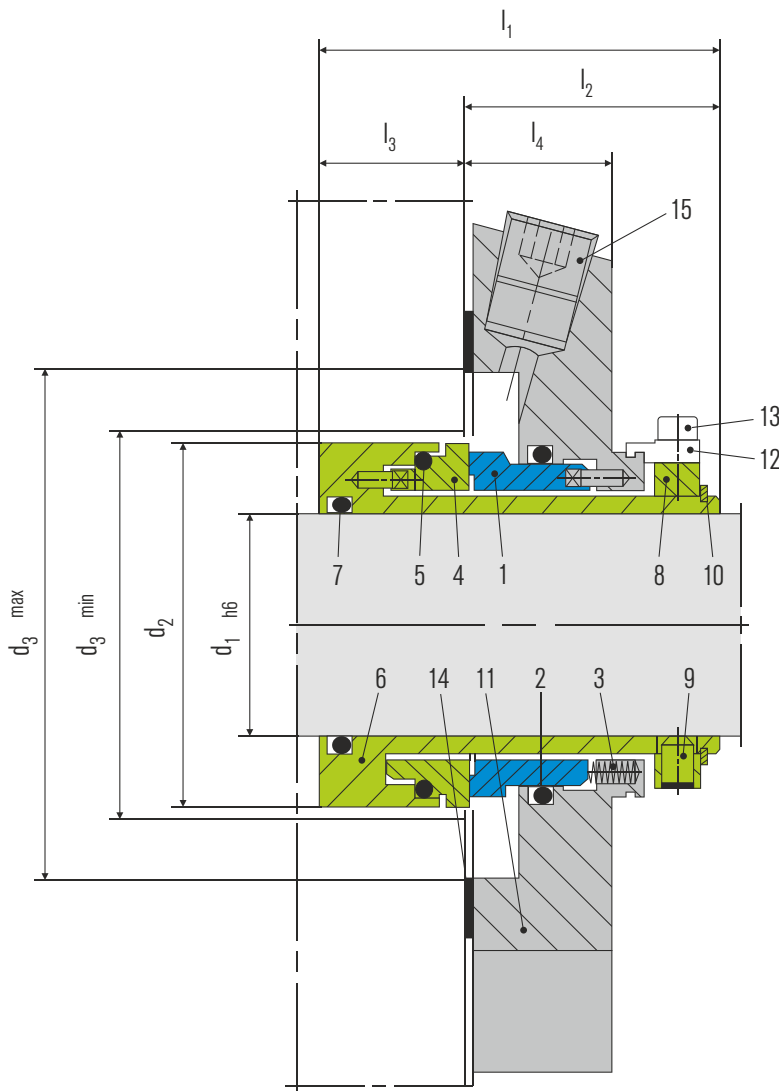


## Product Description

1. Single seal
2. Available for standard (CSX-ASPN) and big bore (CSX-ABPN) seal chambers
3. Balanced
4. Cartridge
5. Independent of direction of rotation
6. Single seals with flush (-ASPN, -ABPN) and with quench combined with lip seal (-ASQN, -ABQN) or throttle ring (-ASTN, -ABTN)

## Technical Features

1. Ideal for use in ANSI process pumps
2. No damage of the shaft by dynamically loaded O-Ring
3. No dimensional modification of the seal chamber necessary, small radial installation height
4. Universal applicable for packings conversions, retrofits or original equipment



## Typical Industrial Applications

ANSI process pumps  
 Chemical industry  
 Food and beverage industry  
 Petrochemical industry  
 Pharmaceutical industry  
 Universally applicable  
 Water and waste water technology

## Standards

ANSI

## Materials

Seal face: Silicon carbide (Q1), Carbon graphite resin impregnated (B), Tungsten carbide (U2)  
 Seat: Silicon carbide (Q1)  
 Secondary seals: FKM (V), EPDM (E), FFKM (K), Perfluorocarbon rubber/PTFE (U1)  
 Springs: Hastelloy® C-4 (M)  
 Metal parts: CrNiMo steel (G), CrNiMo cast steel (G)

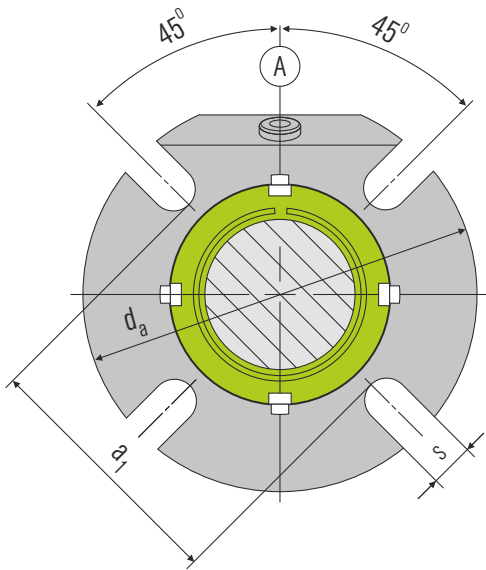
## Performance Capabilities

CSX-SN, -SNO, -QN, -TN  
 Sizes: Upto 100 mm (Upto 4.000")  
 Other sizes on request  
 Temperature:  $t = -40\text{ °C} \dots 220\text{ °C}$  ( $-40\text{ °F} \dots 428\text{ °F}$ )  
 (Check O-Ring resistance)  
 Sliding face material combination BQ1  
 Pressure:  $p_1 = 25\text{ bar}$  (363 PSI)  
 Speed = 16 m/s (52 ft/s)  
 Sliding face material combination Q1Q1 or U2Q1  
 Pressure:  $p_1 = 12\text{ bar}$  (175 PSI)  
 Speed = 10 m/s (33 ft/s)  
 Permissible axial movement:  $\pm 1.0\text{ mm}$ ,  $d_1 \geq 75\text{ mm}$   
 $\pm 1.5\text{ mm}$

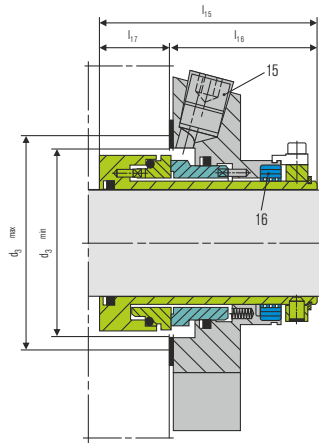
Item	Description
1	Seal face
2, 5, 7	O-Ring
3	Spring
4	Seat
6	Shaft sleeve
8	Drive collar
9	Set screw

Item	Description
10	Snap ring
11	Cover
12	Assembly fixture (remove after installation)
13	Screw
14	Gasket
15	Screw plug
16	Lip seal (-QN), throttle ring (-TN)

## Installation, Details, Options

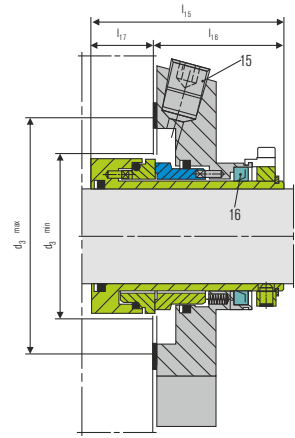


## Product Variants



### CSX-ASTN and -ABTN

Single seal for operation with unpressurized quench for standard (S) and big bore (B) seal chambers. Same as CSX-ASP and -ABPN but with throttle ring (item 16). The cover has auxiliary connections for flushing and quench. Throttle ring: PTFE carbon/graphite reinforced (T12).



### CSX-ASQN and -ABQN

Single seal for operation with unpressurized quench for standard (S) and big bore (B) seal chambers. Same as CSX-ASP and -ABPN version but with lip seal (item 16) at the atmospheric side. The cover has auxiliary connections for flushing and quench. Lip seal: NBR (P), PTFE carbon reinforced (T3)

## Dimensional Data

### BIG BORE : Dimensions in inch

d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub> min	d <sub>3</sub> max	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>15</sub>	l <sub>16</sub>	l <sub>17</sub>	a <sub>1</sub>	d <sub>a</sub>	s	Connection
1.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.125	1.713	1.752	2.795	2.638	1.669	0.969	1.000	2.937	1.909	1.028	3.311	4.500	0.437	1/4 NPT
1.250	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.375	1.960	2.000	3.189	2.638	1.669	0.969	1.000	2.947	1.919	1.028	3.543	5.118	0.437	1/4NPT
1.500	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.625	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.750	2.461	2.500	4.055	2.638	1.669	0.969	1.000	3.012	1.984	1.028	4.567	6.496	0.559	3/8 NPT
1.875	2.583	2.661	3.937	2.638	1.669	0.969	1.000	3.071	2.059	1.012	4.409	5.984	0.551	3/8 NPT
2.000	2.677	2.756	4.567	2.638	1.929	0.709	1.260	3.130	2.102	1.028	4.882	6.260	0.551	3/8 NPT
2.125	2.834	2.913	4.528	2.638	1.669	0.969	1.000	3.012	1.984	1.028	5.276	6.890	0.709	3/8 NPT
2.250	2.960	3.093	4.409	2.638	1.945	0.693	1.276	3.130	2.120	1.028	4.685	6.417	0.709	3/8 NPT
2.500	3.212	3.299	5.276	2.638	1.919	0.719	1.250	3.130	2.120	1.028	5.512	7.795	0.709	3/8 NPT
2.625	3.338	3.170	5.118	2.638	1.919	0.719	1.250	3.130	2.120	1.028	5.354	6.890	0.709	3/8 NPT
2.750	3.660	3.740	5.236	2.638	1.945	0.693	1.276	3.130	2.120	1.028	5.512	7.480	0.630	3/8 NPT
3.000	3.937	4.016	5.512	3.307	2.276	1.031	1.276	3.858	2.516	1.343	5.906	8.228	0.650	3/8 NPT
3.250	-	-	-	-	-	-	-	-	-	-	-	-	-	-

### STANDARD BORE : Dimensions in inch

d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub> min	d <sub>3</sub> max	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>15</sub>	l <sub>16</sub>	l <sub>17</sub>	a <sub>1</sub>	d <sub>a</sub>	s	Connection
1.000	1.693	1.732	2.205	2.638	1.669	0.969	1.000	2.937	1.909	1.028	2.756	3.937	0.433	1/4 NPT
1.125	1.713	1.752	2.205	2.638	1.669	0.969	1.000	2.937	1.909	1.028	2.440	4.134	0.437	1/4 NPT
1.250	1.969	2.008	2.402	2.638	1.669	0.969	1.000	3.130	2.102	1.028	2.638	4.252	0.433	1/4 NPT
1.375	1.961	2.000	2.402	2.638	1.669	0.969	1.000	2.947	1.919	1.028	2.760	4.213	0.437	1/4 NPT
1.500	2.200	2.244	2.717	2.638	1.669	0.969	1.000	3.130	2.102	1.028	2.950	4.488	0.551	3/8 NPT
1.625	2.340	2.421	2.795	2.638	1.669	0.969	1.000	3.130	2.102	1.028	3.030	4.921	0.551	3/8 NPT
1.750	2.461	2.500	2.953	2.638	1.669	0.969	1.000	3.012	1.984	1.028	3.228	5.118	0.559	3/8 NPT
1.875	2.583	2.661	3.070	2.638	1.669	0.969	1.000	3.071	2.043	1.028	3.190	5.118	0.551	3/8 NPT
2.000	2.677	2.756	3.189	2.638	1.669	0.969	1.000	3.130	2.102	1.028	3.430	5.472	0.630	3/8 NPT
2.125	2.834	2.913	3.583	2.638	1.669	0.969	1.000	3.012	1.984	1.028	3.820	5.512	0.650	3/8 NPT
2.250	2.960	3.039	3.583	2.638	1.669	0.969	1.000	3.130	2.102	1.028	3.858	5.866	0.650	3/8 NPT
2.375	3.070	3.125	3.590	2.638	1.669	0.969	1.000	-	-	-	4.020	6.181	0.709	3/8 NPT
2.500	3.212	3.291	3.937	2.638	1.669	0.969	1.122	3.130	2.102	1.028	4.528	6.693	0.709	3/8 NPT
2.625	3.338	3.417	4.016	2.638	1.669	0.969	1.250	3.130	2.102	1.028	4.528	6.378	0.630	3/8 NPT
2.750	3.660	3.740	4.370	2.638	1.929	0.709	1.260	3.130	2.102	1.028	4.646	7.441	0.709	3/8 NPT
3.000	3.937	4.016	4.724	3.307	2.260	1.047	1.260	3.858	2.516	1.343	5.000	7.835	0.709	3/8 NPT
3.250	4.189	4.268	4.921	3.307	2.260	1.047	1.260	3.858	2.516	1.343	5.315	7.830	0.709	3/8 NPT
3.750	4.689	4.750	5.433	3.307	2.260	1.047	1.000	-	-	-	5.827	8.189	0.866	3/8 NPT

Note: Additional technical & dimensional information will be provided on request.

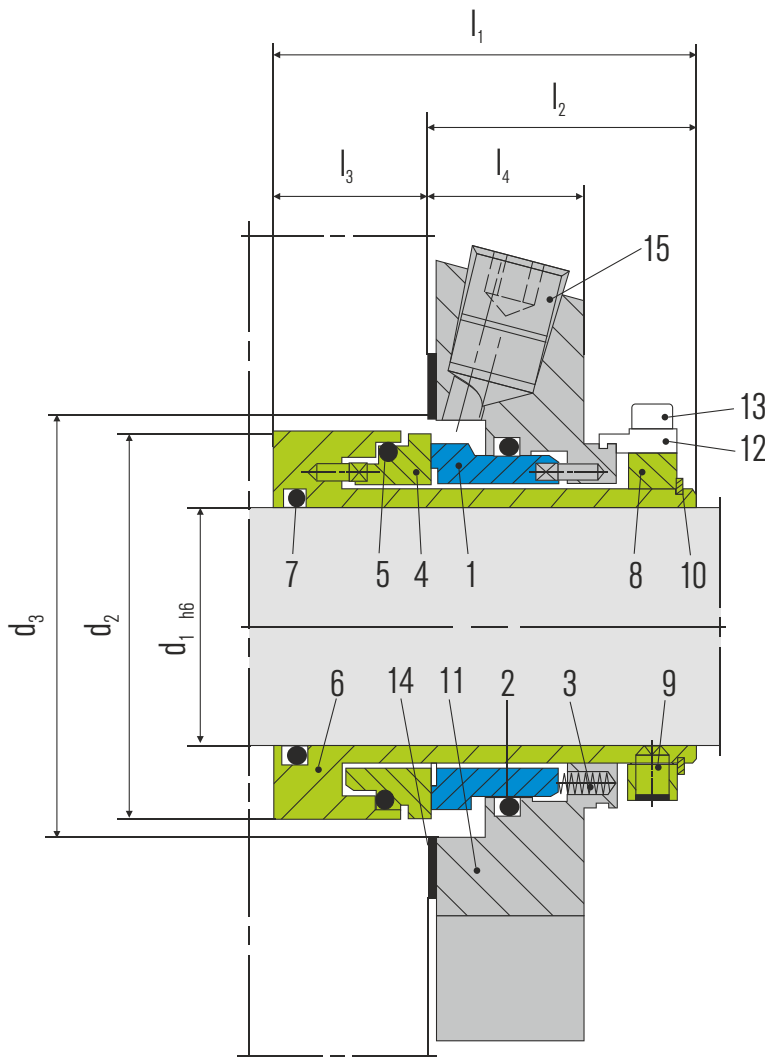


### Product Description

1. Additional variants available for ANSI pumps
2. Balanced
3. Cartridge
4. Independent of direction of rotation
5. Single seal

### Technical Features

1. Cost-effective
2. Easy installation due to pre-assembled unit (reduced down-times)
3. Ideal seal for standardizations
4. No damage caused by dirt entered during assembly
5. No damage of the shaft by dynamically loaded O-Ring
6. Universal applicable for packings conversions, retrofits or original equipment



### Typical Industrial Applications

Chemical industry  
 Food and beverage industry  
 Petrochemical industry  
 Pharmaceutical industry  
 Universally applicable  
 Water and waste water technology  
 Centrifugal pumps  
 Eccentric screw pumps  
 Process pumps

### Standards

ANSI

### Materials

Seal face: Silicon carbide (Q1), Carbon graphite resin impregnated (B), Tungsten carbide (U2)  
 Seat: Silicon carbide (Q1)  
 Secondary seals: FKM (V), EPDM (E), FFKM (K), Perfluorocarbon rubber/PTFE (U1)  
 Springs: Hastelloy® C-4 (M)  
 Metal parts: CrNiMo steel (G), CrNiMo cast steel (G)

### Performance Capabilities

CSX-SN, -SNO, -QN, -TN  
 Sizes: Upto 100 mm (Upto 4.000")  
 Other sizes on request  
 Temperature:  $t = -40\text{ °C} \dots 220\text{ °C}$  ( $-40\text{ °F} \dots 428\text{ °F}$ )  
 (Check O-Ring resistance)  
 Sliding face material combination BQ1  
 Pressure:  $p_1 = 25\text{ bar}$  (363 PSI)  
 Speed = 16 m/s (52 ft/s)  
 Sliding face material combination Q1Q1 or U2Q1  
 Pressure:  $p_1 = 12\text{ bar}$  (175 PSI)  
 Speed = 10 m/s (33 ft/s)  
 Permissible axial movement:  $\pm 1.0\text{ mm}$ ,  $d_1 \geq 75\text{ mm}$   
 $\pm 1.5\text{ mm}$

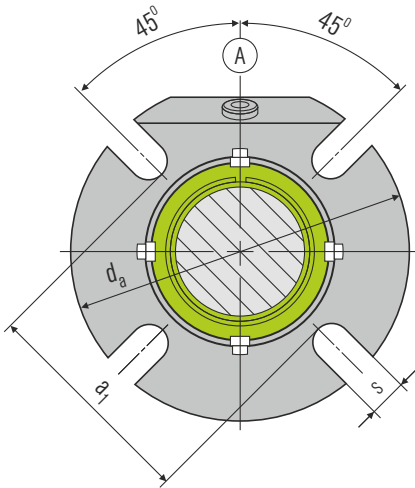
Item	Description
1	Seal face
2, 5, 7	O-Ring
3	Spring
4	Seat
6	Shaft sleeve
8	Drive collar
9	Set screw

Item	Description
10	Snap ring
11	Cover
12	Assembly fixture
13	Screw
14	Gasket
15	Screw plug
16	Lip seal (-QN), throttle ring (-TN)

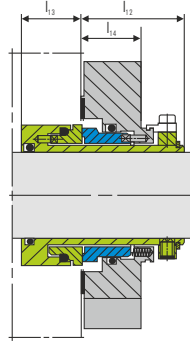


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## Installation, Details, Options

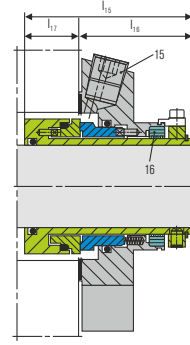


## Design Variations



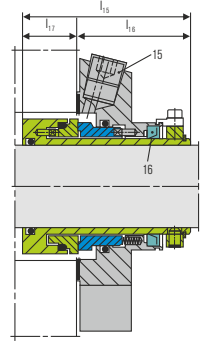
### CSX-SNO

Single seal without connections, for dead-end operation.



### CSX-TN

Single seal for operation with unpressurized quench. Same as CSX-SN but with throttle ring (item 16). The cover has auxiliary connections for flushing and quench. Throttle ring: PTFE carbon-graphite reinforced (T12).



### CSX-QN

Single seal for operation with unpressurized quench. Same as 'SN' version but with outboard lip seal (item 16). The cover has auxiliary connections for flushing and quench. Lip seal: NBR (P), PTFE carbon reinforced (T3).

## Dimensional Data

### Dimensions in inch

d <sub>1</sub>	d <sub>2</sub>	d <sub>3min.</sub>	d <sub>3max.</sub>	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>12</sub>	l <sub>13</sub>	l <sub>14</sub>	l <sub>15</sub>	l <sub>16</sub>	l <sub>17</sub>	a <sub>1</sub>	d <sub>a</sub>	s
1.000	1.693	1.750	2.000	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	2.440	4.134	0.520
1.125	1.811	1.875	2.050	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	2.440	4.134	0.520
1.250	1.960	2.000	2.250	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	2.640	4.330	0.520
1.375	2.086	2.125	2.420	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	2.750	4.449	0.520
1.500	2.200	2.250	2.625	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	2.950	4.842	0.520
1.625	2.340	2.375	2.700	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	3.030	4.842	0.599
1.750	2.460	2.500	2.812	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	3.190	5.433	0.599
1.875	2.582	2.625	2.940	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	3.190	5.433	0.599
2.000	2.677	2.750	3.190	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	3.430	5.827	0.599
2.125	2.834	2.875	3.437	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	3.820	5.827	0.709
2.250	2.960	3.000	3.560	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	3.940	6.181	0.709
2.375	3.070	3.125	3.590	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	4.020	6.181	0.709
2.500	3.212	3.250	3.800	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	4.170	6.417	0.709
2.625	3.338	3.375	3.937	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	4.290	6.417	0.709
2.750	3.660	3.750	4.250	2.640	1.669	0.969	1.000	1.378	1.260	0.689	3.130	2.102	1.028	4.650	7.008	0.709
2.875	3.937	4.000	4.646	3.307	2.260	1.047	1.000	1.815	1.492	0.866	-	-	-	5.079	7.480	0.709
3.000	3.937	4.000	4.646	3.307	2.260	1.047	1.102	1.815	1.492	0.866	3.858	2.516	1.343	5.079	7.480	0.709
3.125	4.190	4.125	4.764	3.307	2.260	1.047	1.102	1.815	1.492	0.866	3.858	2.516	1.343	5.315	7.677	0.709
3.250	4.189	4.250	4.882	3.307	2.260	1.047	1.102	1.815	1.492	0.866	-	-	-	5.315	7.677	0.709
3.375	4.311	4.375	5.039	3.307	2.260	1.047	1.102	1.815	1.492	0.866	-	-	-	5.472	7.795	0.866
3.500	4.437	4.500	5.157	3.307	2.260	1.047	1.102	1.815	1.492	0.866	-	-	-	5.591	7.795	0.866
3.625	4.563	4.625	5.315	3.307	2.260	1.047	1.102	1.815	1.492	0.866	-	-	-	5.709	8.071	0.866
3.750	4.689	4.750	5.433	3.307	2.260	1.047	1.102	1.815	1.492	0.866	3.858	2.516	1.343	5.827	8.189	0.866
4.000	4.937	5.000	5.669	3.307	2.260	1.047	1.102	1.815	1.492	0.866	-	-	-	6.063	8.583	0.866

### Dimensions in millimeter

d <sub>1</sub>	d <sub>2</sub>	d <sub>3min.</sub>	d <sub>3max.</sub>	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>12</sub>	l <sub>13</sub>	l <sub>14</sub>	l <sub>15</sub>	l <sub>16</sub>	l <sub>17</sub>	a <sub>1</sub>	d <sub>a</sub>	s
25	43.0	44.0	51.5	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	62	105	13.2
28	46.0	47.0	52.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	62	105	13.2
30	48.0	49.0	56.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	65	110	13.2
32	49.8	51.0	57.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	67	110	13.2
33	49.8	51.0	57.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	67	113	13.2
35	53.0	54.0	61.5	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	70	123	13.2
38	56.0	57.0	66.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	75	123	14.2
40	58.0	59.0	68.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	75	133	14.2
42	60.5	61.5	69.5	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	80	133	14.2
43	60.5	61.5	70.5	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	80	138	14.2
45	62.5	64.0	73.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	81	138	14.2
48	65.6	67.0	75.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	84	148	14.2
50	68.0	69.0	78.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	87	148	18.0
53	72.0	73.0	87.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	97	148	18.0
55	73.0	74.0	83.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	90	148	18.0
60	78.0	79.0	91.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	102	157	18.0
65	84.8	85.7	98.5	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	109	163	18.0
70	93.0	95.0	108.0	67	42.4	24.6	25.4	35.0	32.0	17.5	79.5	53.4	26.1	118	178	18.0
75	100.0	101.6	118.0	84	57.4	26.6	28.0	46.1	37.9	22.0	98.0	63.9	34.1	129	190	18.0
80	106.4	108.0	124.0	84	57.4	26.6	28.0	46.1	37.9	22.0	98.0	63.9	34.1	135	195	18.0
85	109.5	111.1	128.0	84	57.4	26.6	28.0	46.1	37.9	22.0	98.0	63.9	34.1	139	198	22.0
90	115.9	117.5	135.0	84	57.4	26.6	28.0	46.1	37.9	22.0	98.0	63.9	34.1	145	205	22.0
95	119.1	120.7	138.0	84	57.4	26.6	28.0	46.1	37.9	22.0	98.0	63.9	34.1	148	208	22.0
100	125.4	127.0	144.0	84	57.4	26.6	28.0	46.1	37.9	22.0	98.0	63.9	34.1	154	218	22.0

Note: Additional technical & dimensional information will be provided on request.

# CSX ANSI Dual Seals Mechanical Seals for Pumps · Standard Cartridge Seals

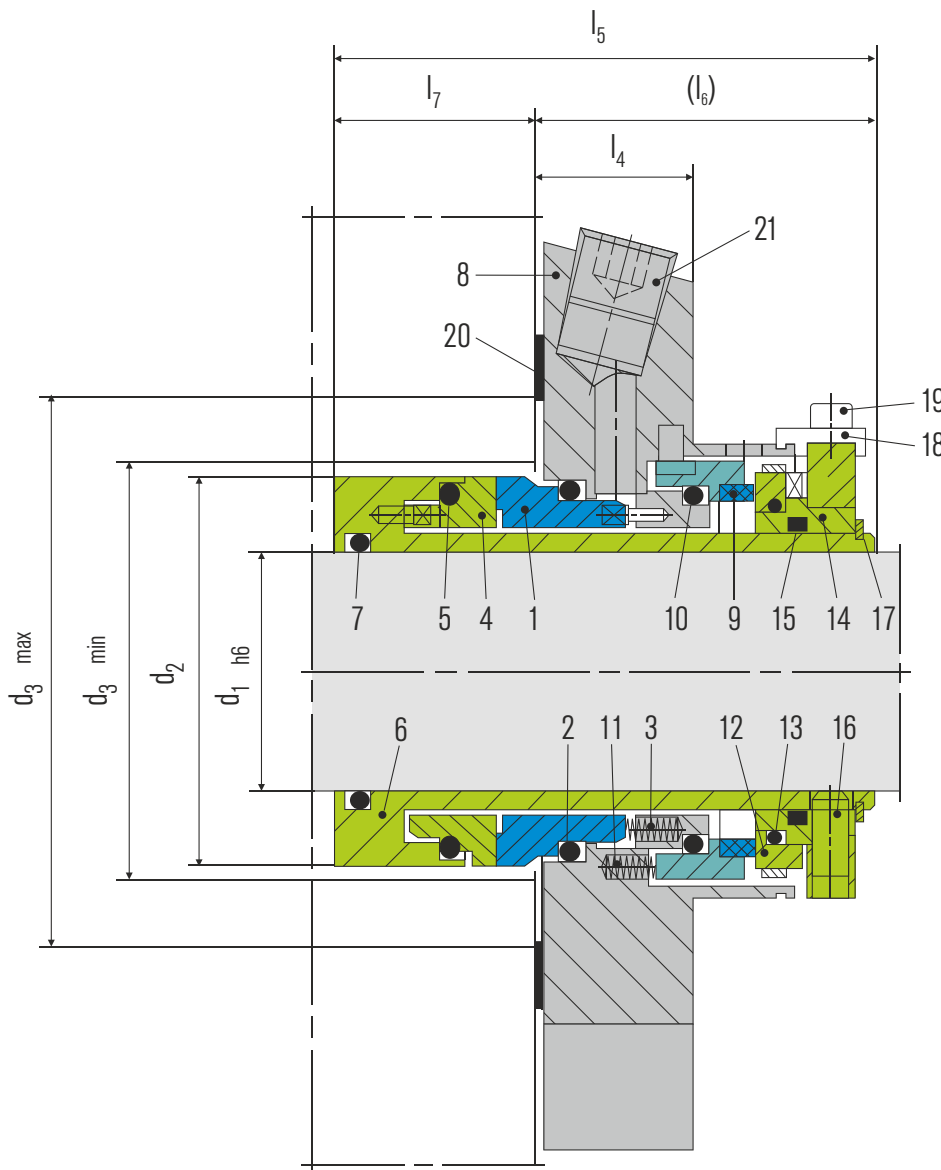


## Product Description

1. Dual seal
2. Available for standard (CSX-ASDN) and big bore (CSX-ABDN) seal chambers
3. Balanced
4. Cartridge
5. Double pressure balanced
6. Independent of direction of rotation
7. Integrated pumping device

## Technical Features

1. Ideal for use in ANSI process pumps
2. No damage of the shaft by dynamically loaded O-Ring
3. No dimensional modification of the seal chamber necessary, small radial installation height
4. Universal applicable for packings conversions, retrofits or OEM



## Typical Industrial Applications

ANSI process pumps  
 Chemical industry  
 Food and beverage industry  
 Petrochemical industry  
 Pharmaceutical industry  
 Universally applicable  
 Water and waste water technology

## Standards

ANSI

## Materials

Seal face: Silicon carbide (Q1), Carbon graphite resin impregnated (B), Tungsten carbide (U2)  
 Seat: Silicon carbide (Q1)  
 Secondary seals: FKM (V), EPDM (E), FFKM (K), Perfluorocarbon rubber/PTFE (U1)  
 Springs: Hastelloy® C-4 (M)  
 Metal parts: CrNiMo steel (G), CrNiMo cast steel (G)

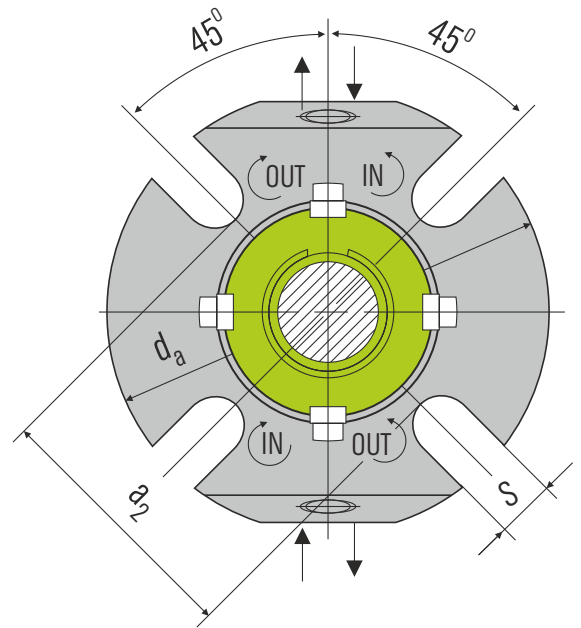
Item	Description
1	Seal face
2, 5, 7, 10, 13, 15	O-Ring
3	Spring
4	Seat
6	Shaft sleeve
8	Cover
9	Seal face
11	Spring
12	Seat
14	Drive collar
16	Set screw
17	Snap ring
18	Assembly fixture
19	Hex socket head screw
20	Gasket
21	Screw plug

# DIE DICHTUNGS - COMPANY

## Performance Capabilities

Sizes:  $d_1 =$  Upto 100 mm (Upto 4.000")  
 Other sizes on request  
 Temperature:  $t = -40\text{ }^\circ\text{C} \dots 220\text{ }^\circ\text{C}$  ( $-40\text{ }^\circ\text{F} \dots 428\text{ }^\circ\text{F}$ )  
 (Check O-Ring resistance)  
 Sliding face material combination BQ1  
 Pressure:  $p_1 = 25\text{ bar}$  (363 PSI)  
 Speed = 16 m/s (52 ft/s)  
 Sliding face material combination Q1Q1 or U2Q1  
 Pressure:  $p_1 = 20\text{ bar}$  (290 PSI)  
 Speed = 10 m/s (33 ft/s)  
 Barrier fluid circulation system:  
 $p_{3\text{max}} = 25\text{ bar}$  (363 PSI)  
 $\Delta p$  ( $p_3 - p_1$ ) ideal = 2 ... 3 bar (29 ... 44 PSI),  
 7 bar (102 PSI) for barrier media with poor lubricating properties)  
 Pump startup:  
 $\Delta p$  ( $p_3 - p_1$ )max = 25 bar (363 PSI) allowed  
 Recommended supply medium: max. ISO VG 5  
 Permissible axial movement:  $\pm 1.0\text{ mm}$ ,  $d_1 \geq 75\text{ mm} \pm 1.5\text{ mm}$

## Installation, Details, Options



## Dimensional Data

### BIG BORE - Dimensions in inch

$d_1$	$d_2$	$d_3$ min.	$d_3$ max.	$l_4$	$l_5$	$l_6$	$l_7$	$a_2$	$d_a$	$s$	Connection
1.000	-	-	-	-	-	-	-	-	-	-	-
1.125	1.713	1.752	2.795	1.000	3.228	1.886	1.343	3.311	4.500	0.437	1/4 NPT
1.250	-	-	-	-	-	-	-	-	-	-	-
1.375	1.960	2.000	3.189	1.000	3.406	2.083	1.323	3.543	5.118	0.437	1/4 NPT
1.500	-	-	-	-	-	-	-	-	-	-	-
1.625	-	-	-	-	-	-	-	-	-	-	-
1.750	2.461	2.500	4.055	1.000	3.406	2.083	1.323	4.567	6.496	0.559	3/8 NPT
1.875	2.583	2.661	3.937	1.000	3.406	2.083	1.323	4.409	5.984	0.551	3/8 NPT
2.000	2.677	2.756	4.567	1.260	3.406	2.102	1.303	4.882	6.260	0.551	3/8 NPT
2.125	2.834	2.913	4.528	1.000	3.406	2.102	1.303	5.276	6.890	0.709	3/8 NPT
2.250	2.960	3.093	4.409	1.276	3.406	2.102	1.303	4.685	6.417	0.709	3/8 NPT
2.500	3.212	3.299	5.276	1.250	3.406	2.102	1.303	5.512	7.795	0.709	3/8 NPT
2.625	3.338	3.170	5.118	1.250	3.406	2.102	1.303	5.354	6.890	0.709	3/8 NPT
2.750	3.660	3.740	5.236	1.276	3.406	2.102	1.303	5.512	7.480	0.630	3/8 NPT
3.000	3.937	4.016	5.512	1.276	3.406	2.516	1.303	5.906	8.228	0.650	3/8 NPT
3.250	-	-	-	-	-	-	-	-	-	-	-

### STANDARD BORE - Dimensions in inch

$d_1$	$d_2$	$d_3$ min.	$d_3$ max.	$l_4$	$l_5$	$l_6$	$l_7$	$a_2$	$d_a$	$s$	Connection
1.000	1.693	1.732	2.205	1.000	3.406	2.102	1.303	2.441	3.937	0.433	1/4 NPT
1.125	1.713	1.752	2.205	1.000	3.228	3.228	1.343	2.441	4.134	0.437	1/4 NPT
1.250	1.969	2.008	2.402	1.000	3.406	2.102	1.303	2.756	4.252	0.433	1/4 NPT
1.375	1.961	2.000	2.402	1.000	3.406	2.083	1.303	2.756	4.213	0.437	1/4 NPT
1.500	2.200	2.244	2.717	1.000	3.406	2.102	1.303	2.953	4.488	0.551	3/8 NPT
1.625	2.340	2.421	2.795	1.000	3.406	2.102	1.303	3.091	4.921	0.551	3/8 NPT
1.750	2.461	2.500	2.953	1.000	3.406	2.102	1.303	3.228	5.118	0.559	3/8 NPT
1.875	2.583	2.661	3.070	1.000	3.406	2.102	1.303	3.307	5.118	0.551	3/8 NPT
2.000	2.677	2.756	3.189	1.000	3.406	2.102	1.303	3.425	5.472	0.630	3/8 NPT
2.125	2.834	2.913	3.583	1.000	3.406	2.102	1.303	3.819	5.512	0.650	3/8 NPT
2.250	2.960	3.039	3.583	1.000	3.406	2.102	1.303	3.858	5.866	0.650	3/8 NPT
2.375	3.070	3.125	3.590	1.000	-	-	-	-	6.181	0.709	3/8 NPT
2.500	3.212	3.291	3.937	1.122	3.406	2.102	1.303	4.528	6.693	0.709	3/8 NPT
2.625	3.338	3.417	4.016	1.250	3.406	2.102	1.303	4.528	6.378	0.630	3/8 NPT
2.750	3.660	3.740	4.370	1.260	3.406	2.102	1.303	4.646	7.441	0.709	3/8 NPT
3.000	3.937	4.016	4.724	1.260	4.252	2.516	1.736	5.000	7.835	0.709	3/8 NPT
3.250	4.189	4.268	4.921	1.260	4.252	2.516	1.736	5.315	7.830	0.709	3/8 NPT
3.750	4.689	4.750	5.433	1.000	-	-	-	-	8.189	0.866	3/8 NPT

Note: Additional technical & dimensional information will be provided on request.

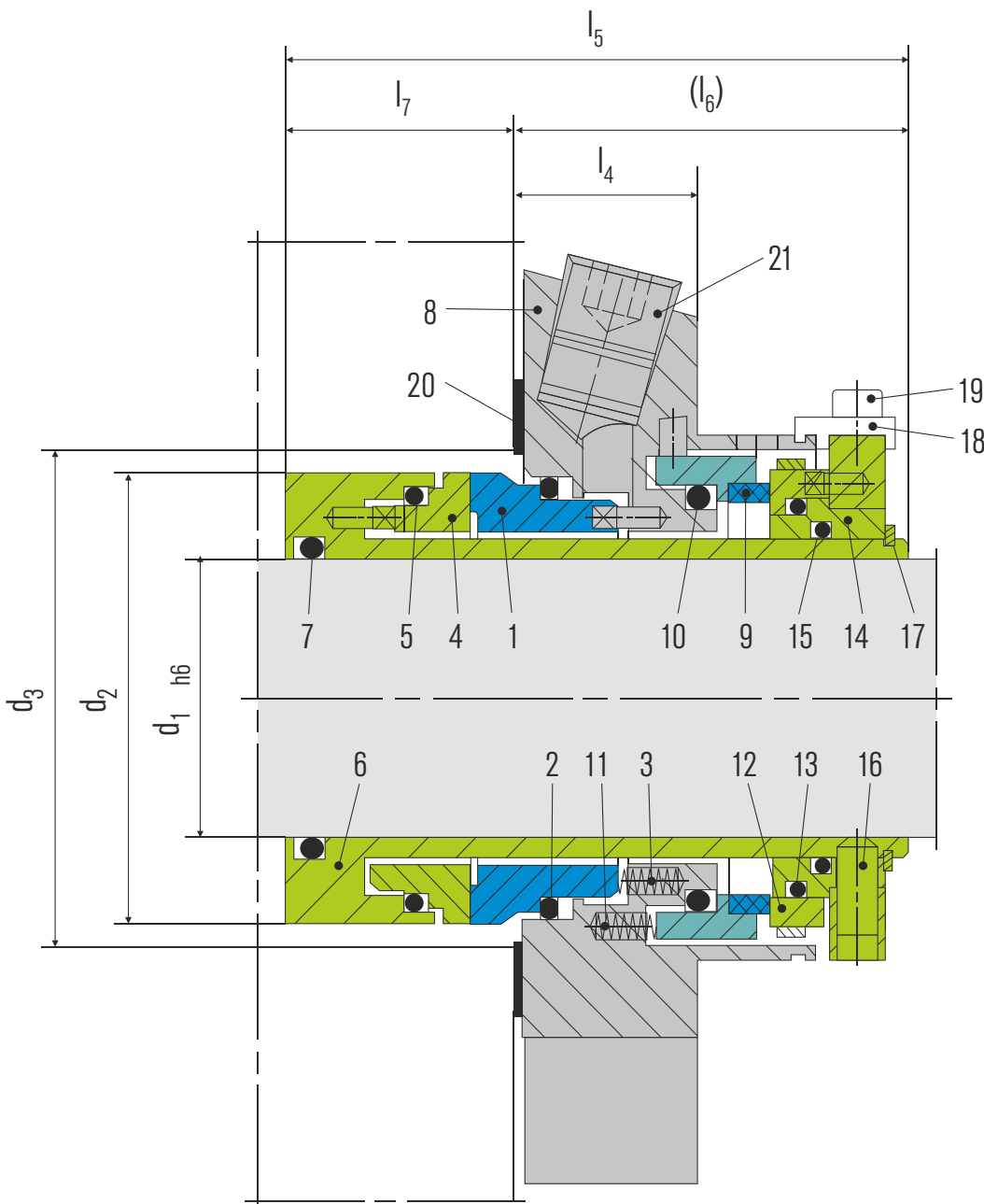


### Product Description

1. Balanced
2. Cartridge
3. Double pressure balanced
4. Dual seal
5. Independent of direction of rotation
6. Integrated pumping device
7. Variants available: for eccentric screw pumps

### Technical Features

1. Cost-effective
2. Easy installation due to pre-assembled unit (reduced down-times)
3. Extended service life
4. Ideal seal for standardizations
5. No damage of the shaft by dynamically loaded O-Ring
6. Universal applicable for packings conversions, retrofits or OEM



Item	Description
1	Seal face
2, 5, 7, 10, 13, 15	O-Ring
3	Spring
4	Seat
6	Shaft sleeve
8	Cover
9	Seal face
11	Spring
12	Seat
14	Drive collar
16	Set screw
17	Snap ring
18	Assembly fixture
19	Hex socket head screw
20	Gasket
21	Screw plug

# DIE DICHTUNGS - COMPANY

## Typical Industrial Applications

Chemical industry  
 Food and beverage industry  
 Petrochemical industry  
 Pharmaceutical industry  
 Universally applicable  
 Water and waste water technology  
 Centrifugal pumps  
 Eccentric screw pumps

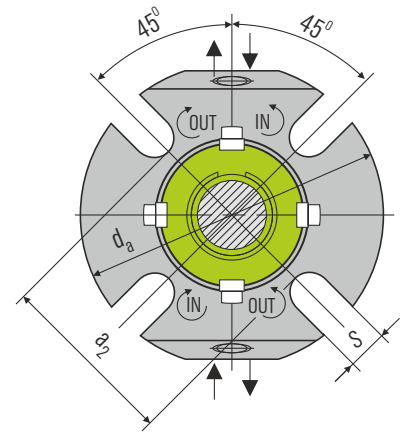
## Materials

Seal face: Silicon carbide (Q1), Carbon graphite resin impregnated (B), Tungsten carbide (U2)  
 Seat: Silicon carbide (Q1)  
 Secondary seals: FKM (V), EPDM (E), FFKM (K), Perfluorocarbon rubber/PTFE (U1)  
 Springs: Hastelloy® C-4 (M)  
 Metal parts: CrNiMo steel (G), CrNiMo cast steel (G)

## Performance Capabilities

Sizes:  $d_1 =$  Upto 100 mm (Upto 4.000")  
 Other sizes on request  
 Temperature:  $t = -40\text{ °C} \dots 220\text{ °C}$  ( $-40\text{ °F} \dots 428\text{ °F}$ )  
 (Check O-Ring resistance)  
 Sliding face material combination BQ1  
 Pressure:  $p_1 = 25\text{ bar}$  (363 PSI)  
 Speed = 16 m/s (52 ft/s)  
 Sliding face material combination Q1Q1 or U2Q1  
 Pressure:  $p_1 = 20\text{ bar}$  (290 PSI)  
 Speed = 10 m/s (33 ft/s)  
 Barrier fluid circulation system:  
 $p_{3\text{max}} = 25\text{ bar}$  (363 PSI)  
 $\Delta p (p_3 - p_1) \text{ ideal} = 2 \dots 3\text{ bar}$  (29 ... 44 PSI),  
 7 bar (102 PSI) for barrier media with poor lubricating properties)  
 Pump startup:  
 $\Delta p (p_3 - p_1) \text{ max} = 25\text{ bar}$  (363 PSI) allowed  
 Recommended supply medium: max. ISO VG 5  
 Permissible axial movement:  $\pm 1.0\text{ mm}$ ,  
 $d_1 \geq 75\text{ mm} \pm 1.5\text{ mm}$

## Installation, Details, Options



## Dimensional Data

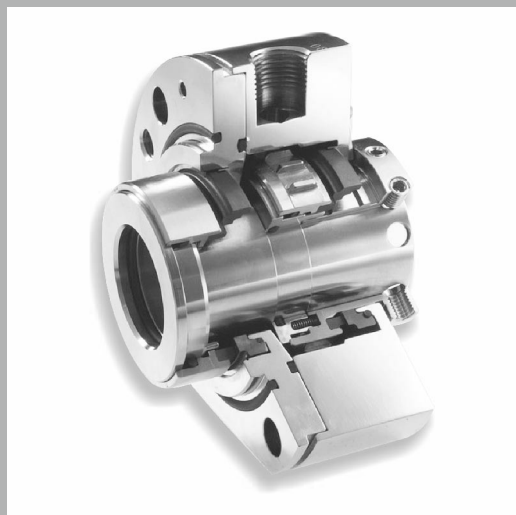
### Dimensions in inch

$d_1$	$d_2$	$d_3 \text{ min.}$	$d_3 \text{ max.}$	$l_4$	$l_5$	$l_6$	$l_7$	$a_2$	$d_a$	$s$
1.000	1.693	1.732	2.008	1.000	3.400	2.102	1.303	2.440	4.134	0.520
1.125	1.811	1.875	2.050	1.000	3.400	2.102	1.303	2.402	4.134	0.520
1.250	1.961	2.008	2.244	1.000	3.400	2.102	1.303	2.760	4.330	0.520
1.375	2.087	2.216	2.421	1.000	3.400	2.102	1.303	2.840	4.449	0.520
1.500	2.205	2.244	2.598	1.000	3.400	2.102	1.303	2.950	4.843	0.520
1.625	2.343	2.375	2.700	1.000	3.400	2.102	1.303	3.090	4.842	0.559
1.750	2.461	2.520	2.874	1.000	3.400	2.102	1.303	3.230	5.433	0.559
1.875	2.582	2.638	2.953	1.000	3.400	2.102	1.303	3.350	5.433	0.559
2.000	2.677	2.717	3.071	1.000	3.400	2.102	1.303	3.430	5.827	0.559
2.125	2.835	2.874	3.425	1.000	3.400	2.102	1.303	3.819	5.827	0.709
2.250	2.961	3.000	3.560	1.000	3.400	2.102	1.303	3.940	6.181	0.709
2.375	3.071	3.125	3.583	1.000	3.400	2.102	1.303	4.020	6.181	0.709
2.500	3.213	3.300	3.800	1.000	3.400	2.102	1.303	4.180	6.417	0.709
2.625	3.339	3.374	3.937	1.000	3.400	2.102	1.303	4.303	6.417	0.709
2.750	3.661	3.740	4.252	1.000	3.400	2.102	1.303	4.660	7.008	0.709
2.875	3.937	4.000	4.646	1.000	4.250	2.516	1.736	5.079	7.480	0.709
3.000	3.937	4.000	4.646	1.102	4.250	2.516	1.736	5.079	7.480	0.709
3.125	4.189	4.252	4.882	1.102	4.250	2.516	1.736	5.315	7.677	0.709
3.250	4.189	4.252	4.882	1.102	4.250	2.516	1.736	5.315	7.677	0.709
3.375	4.311	4.375	5.039	1.102	4.250	2.516	1.736	5.472	7.795	0.866
3.500	4.437	4.500	5.517	1.102	4.250	2.516	1.736	5.591	7.795	0.866
3.625	4.563	4.625	5.315	1.102	4.250	2.516	1.736	5.709	8.071	0.866
3.750	4.689	4.752	5.433	1.102	4.250	2.516	1.736	5.827	8.189	0.866
4.000	4.937	5.000	5.669	1.102	4.250	2.516	1.736	6.063	8.583	0.866

### Dimensions in millimeter

$d_1$	$d_2$	$d_3 \text{ min.}$	$d_3 \text{ max.}$	$l_4$	$l_5$	$l_6$	$l_7$	$a_2$	$d_a$	$s$
25	43.0	44.0	51.5	25.4	86.5	53.4	33.1	62	105	13.2
28	46.0	47.0	52.0	25.4	86.5	53.4	33.1	62	105	13.2
30	48.0	49.0	56.0	25.4	86.5	53.4	33.1	67	105	13.2
32	49.8	51.0	57.0	25.4	86.5	53.4	33.1	70	110	13.2
33	49.8	51.0	57.0	25.4	86.5	53.4	33.1	70	110	13.2
35	53.0	54.0	61.5	25.4	86.5	53.4	33.1	72	113	13.2
38	56.0	57.0	66.0	25.4	86.5	53.4	33.1	75	123	13.2
40	58.0	59.0	68.0	25.4	86.5	53.4	33.1	77	123	14.2
42	60.5	61.5	69.5	25.4	86.5	53.4	33.1	80	133	14.2
43	60.5	61.5	70.5	25.4	86.5	53.4	33.1	80	133	14.2
45	62.5	64.0	73.0	25.4	86.5	53.4	33.1	82	138	14.2
48	65.6	67.0	75.0	25.4	86.5	53.4	33.1	85	138	14.2
50	68.0	69.0	78.0	25.4	86.5	53.4	33.1	87	148	14.2
53	72.0	73.0	87.0	25.4	86.5	53.4	33.1	97	148	18.0
55	73.0	74.0	83.0	25.4	86.5	53.4	33.1	92	148	18.0
60	78.0	79.0	91.0	25.4	86.5	53.4	33.1	102	157	18.0
65	84.8	85.7	98.5	25.4	86.5	53.4	33.1	109	163	18.0
70	93.0	95.0	108.0	25.4	86.5	53.4	33.1	118	178	18.0
75	100.0	101.6	118.0	28.0	108.0	63.9	44.1	129	190	18.0
80	106.4	108.0	124.0	28.0	108.0	63.9	44.1	135	195	18.0
85	109.5	111.1	128.0	28.0	108.0	63.9	44.1	139	198	22.0
90	115.9	117.5	135.0	28.0	108.0	63.9	44.1	145	205	22.0
95	119.1	120.7	138.0	28.0	108.0	63.9	44.1	148	208	22.0
100	125.4	127.0	144.0	28.0	108.0	63.9	44.1	154	218	22.0

Note: Additional technical & dimensional information will be provided on request.

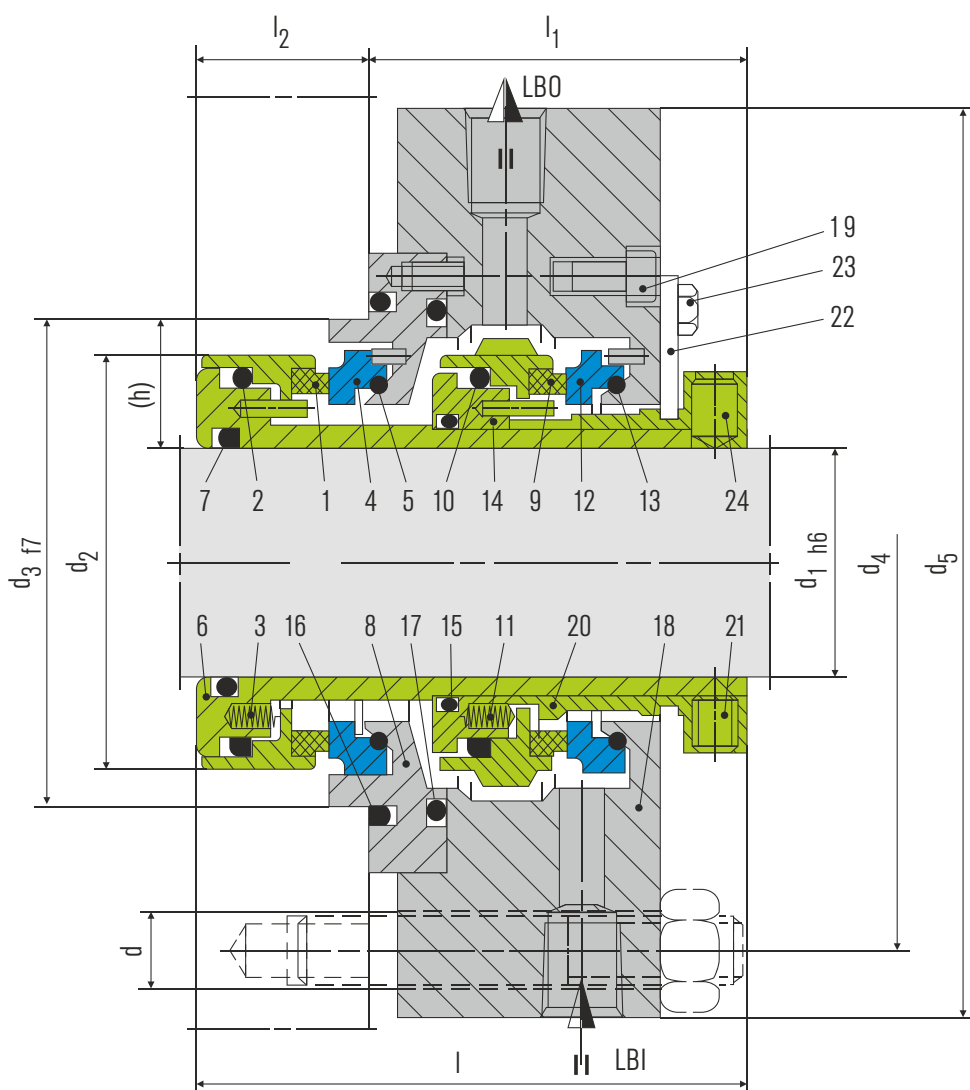


### Product Description

1. Balanced
2. Cartridge construction
3. Category 1, Type A, Arrangement 1, 2 or 3
4. Dual seals with API Plan 52 / 53 (CSXAPI-DAP)
5. Other flush plans available
6. Seal design according API 682 / ISO 21 049
7. Shrink-fitted seal faces
8. Single and dual seals
9. Single seal with API Plan 11 and 61 (CSXAPI-SA)
10. Solid seats
11. Version with independent direction of rotation available

### Technical Features

1. Accommodates shaft deflections and process fluctuations
2. Good heat dissipation
3. Low space requirements
4. Pre-assembled unit, ready to install
5. Springs protected from the product
6. Suitable for pressure reversal



### Typical Industrial Applications

Chemical industry  
 Light volatile and highly viscous hydrocarbons  
 Low solids content and low abrasive media  
 Media with poor lubrication properties  
 Oil and gas industry  
 Petrochemical industry  
 Toxic and hazardous media  
 Standard pumps  
 Vertical and horizontal ANSI chemical pumps

### Standards

API 682 / ISO 21049

### Materials

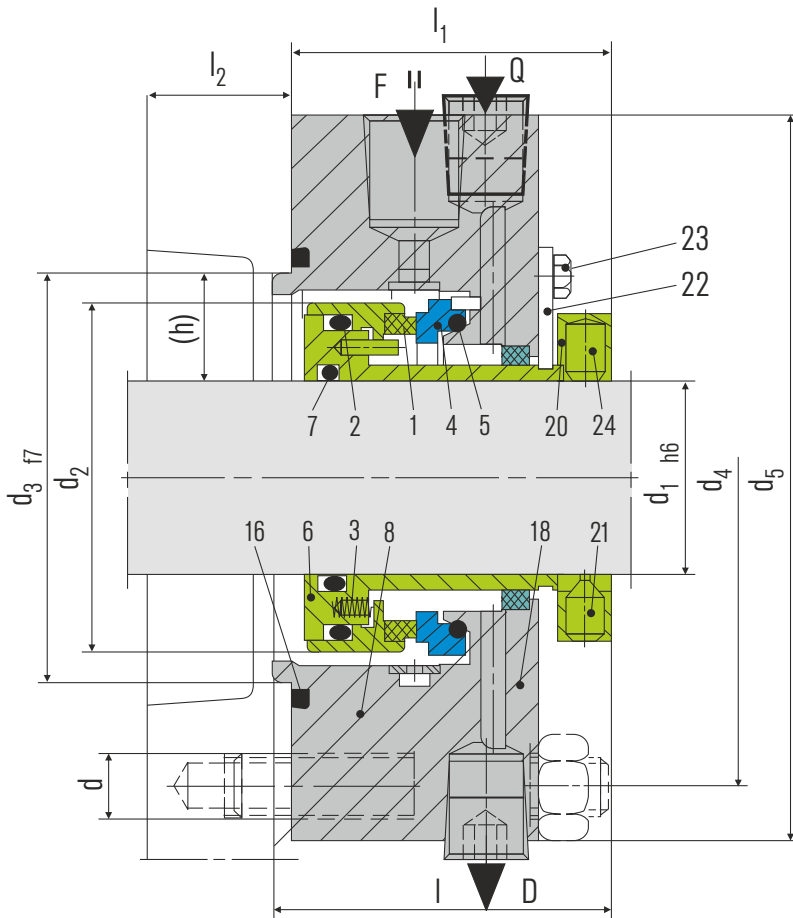
Seal face: Carbon graphite antimony impregnated (A), Silicon carbide sintered pressureless (Q12)  
 Seat: Silicon carbide sintered pressureless (Q1)  
 Secondary seals: FKM (V), FFKM (K), NBR (P), EPDM (E)  
 Springs: Hastelloy® C-4 (M)\* and C-276 (M5)  
 Metal parts: CrNiMo steel (G)

### Performance Capabilities

Sizes:  $d_1 =$  Upto 110 mm (Upto 4.250")  
 other sizes on request  
 Pressure:  $p_1 = 22$  bar (319 PSI)  
 Temperature:  $t = -40$  °C ... 260 °C (-40 °F ... 500 °F)  
 (>220 °C (428 °F) please enquire)  
 Speed = 23 m/s (75 ft/s)

Item	Description
1, 9	Seal face
2, 5, 7, 10, 13, 15, 16, 17	O-Ring
3, 11	Spring
4, 12	Seat
6	Shaft sleeve
8	Adapter
14	Driver
18	Housing
19	HSH Cap screw
20	Set ring
21	Set screw
22	Assembly fixture
23	Hexagon bolt
24	Set screw

## Design Variations



**CSXAPI-SA**  
Single Seal

## Dimensional Data

Dimensions in millimeter

d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	l	l <sub>1</sub>	l <sub>2</sub>	d	anz	acc to ASME B73.1 (h min)
20	50.4	58	105	127	96.5	68.5	28	13.5	4	19.05
25	55.4	63	110	132	96.5	68.5	28	13.5	4	19.05
30	60.4	68	115	137	96.5	68.5	28	13.5	4	19.05
35	65.4	73	120	142	96.5	68.5	28	13.5	4	19.05
40	70.4	78	125	147	96.5	68.5	28	13.5	4	19.05
45	75.4	83	135	162	96.5	68.5	28	17.5	4	19.05
50	80.4	88	140	167	100	72	28	17.5	4	19.05
55	85.4	93	145	172	100	72	28	17.5	4	19.05
60	96	105	160	187	127.5	88	39.5	17.5	4	22.22
65	101	110	165	192	127.5	88	39.5	17.5	4	22.22
70	106	115	170	197	127.5	88	39.5	17.5	4	22.22
75	111	120	175	202	127.5	88	39.5	17.5	4	22.22
80	116	125	185	213	127.5	88	39.5	22	4	22.22
85	123.5	136	190	223	131.5	92	39.5	22	4	25.4
90	128.5	141	195	228	131.5	92	39.5	22	4	25.4
95	133.5	146	200	233	131.5	92	39.5	22	4	25.4
100	138.5	151	205	238	131.5	92	39.5	22	4	25.4
105	143.5	156	210	243	131.5	92	39.5	22	4	25.4
110	152.5	161	215	248	131.5	92	39.5	22	4	25.4

inch size available from size 0.750 to 4.250

Note: Additional technical & dimensional information will be provided on request.

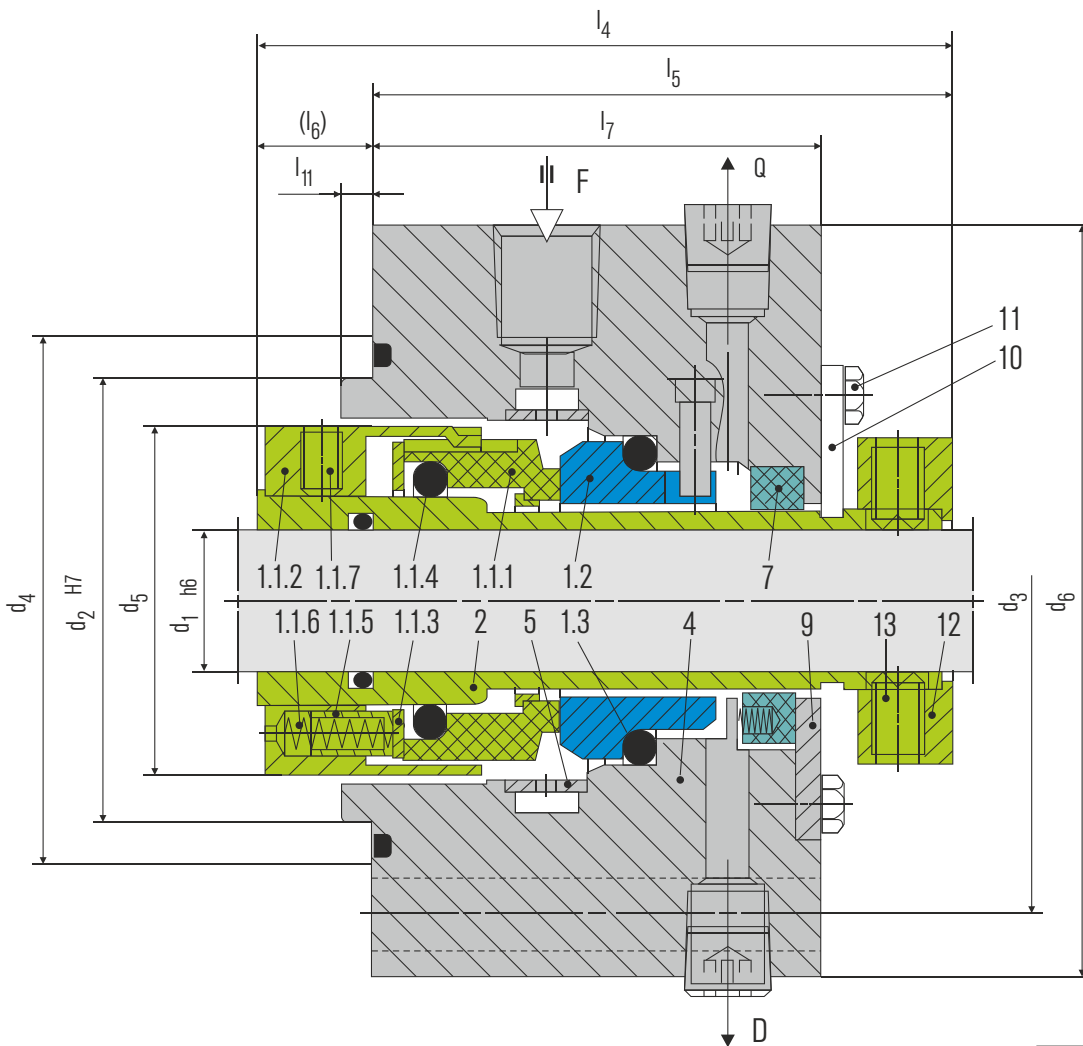


### Product Description

1. Cartridge unit
2. Category 2 and 3, Type A, Arrangement 1
3. Design acc. to API 682 / ISO 21 049
4. Independent of direction of rotation
5. Integrated pumping device available (HFA-VP)
6. Rotating multiple springs
7. Single seal

### Technical Features

1. "Low-Emission-Seal" acc. to the American STLE-limits
2. Extended field of operation in terms of temperature and pressure
3. Fits to any seal chamber
4. Metal parts also in special materials available



Item	Description
1.1.1	Seal face
1.1.2	Driver
1.1.3	Thrust ring
1.1.4, 1.3	O-Ring
1.1.5	Sleeve
1.1.6	Spring
1.1.7	Set screw
1.2	Seat

Item	Description
2	Shaft sleeve
4	Housing
5	Insert
7	Throttle ring
9	Washer
10	Assembly fixture
11	Hexagon bolt
12	Set ring
13	Set screw



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Typical Industrial Applications	Materials
Light hydrocarbons Oil and gas industry Petrochemical industry Refining technology API 610 / ISO 13709 pumps Process pumps	Seal face: Carbon graphite antimony impregnated (A) Seat: Silicon carbide (Q1, Q2) Secondary seals: EPDM (E), NBR (P), FKM (V), FFKM (K) Springs: Hastelloy® C-4 (M) Metal parts: CrNiMo steel (G), Duplex (G1), Hastelloy® C-4 (M)
Performance Capabilities	Design Variations
Sizes: d = Upto 110 mm (Upto 4.250")* Pressure: p1 = 40 bar (580 PSI) Temperature: t = -40 °C ... +220 °C (-40 °F... 428 °F) Speed = 23 m/s (75 ft/s) Permissible axial movement: ± 2.0 ... 4.0 mm depending on diameter and installation situation	<b>HFA-VP</b> Dimensions, items and descriptions as HFA-VN, but with pumping ring. Shorter installation length possible.
Standards	<b>HFA-N</b> Dimensions, items and description as HFA-VN. Seal face: Silicon carbide (Q1, Q2) Seat: Silicon carbide (Q1, Q2)
API 682 / ISO 21049	

## Dimensional Data

### Dimensions in inch

API/d <sub>1</sub>	API/d <sub>2</sub>	API/d <sub>3</sub>	API/d <sub>4</sub>	d <sub>5</sub>	d <sub>6</sub>	l <sub>4</sub>	l <sub>5</sub>	l <sub>6</sub>	l <sub>7</sub>	l <sub>11</sub>	Overall length
0.750	2.756	4.134	3.346	1.969	5.433	3.740	3.701	0.039	2.992	0.236	3.937
1.125	3.150	4.528	3.740	2.441	5.827	3.957	3.858	0.098	3.031	0.236	4.094
1.500	3.543	4.921	4.134	2.835	6.220	4.154	3.878	0.276	3.051	0.236	4.921
2.000	3.937	5.512	4.528	3.386	6.614	4.390	3.917	0.472	3.091	0.236	5.512
2.250	4.724	6.299	5.315	3.898	7.402	4.744	4.016	0.728	3.189	0.236	6.299
2.750	5.118	6.693	5.709	4.291	7.795	4.902	4.173	0.709	3.189	0.236	6.693
3.125	5.512	7.087	6.102	4.685	8.189	5.079	4.173	0.906	3.189	0.236	7.087
3.500	6.299	8.071	6.890	5.079	9.370	5.079	4.173	0.906	3.189	0.236	8.071
3.750	6.693	8.465	7.283	6.024	9.764	5.236	4.291	0.945	3.189	0.236	8.465
4.250	7.087	8.858	7.677	6.614	10.157	5.236	4.291	0.945	3.189	0.236	8.858

### Dimensions in millimeter

API/d <sub>1</sub>	API/d <sub>2</sub>	API/d <sub>3</sub>	API/d <sub>4</sub>	d <sub>5</sub>	d <sub>6</sub>	l <sub>4</sub>	l <sub>5</sub>	l <sub>6</sub>	l <sub>7</sub>	l <sub>11</sub>	Overall length
20	70	105	85	50	138	95.0	94.0	1.0	76.0	6	100
30	80	115	95	62	148	100.5	98.0	2.5	77.0	6	104
40	90	125	105	72	158	105.5	98.5	7.0	77.5	6	125
50	100	140	115	86	168	111.5	99.5	12.0	78.5	6	140
60	120	160	135	99	188	120.5	102.0	18.5	81.0	6	160
70	130	170	145	109	198	124.5	106.0	18.0	81.0	6	170
80	140	180	155	119	208	129.0	106.0	23.0	81.0	6	180
90	160	205	175	129	238	129.0	106.0	23.0	81.0	6	205
100	170	215	185	153	248	133.0	109.0	24.0	81.0	6	215
110	180	225	195	168	258	133.0	109.0	24.0	81.0	6	225

Note: Additional technical & dimensional information will be provided on request.

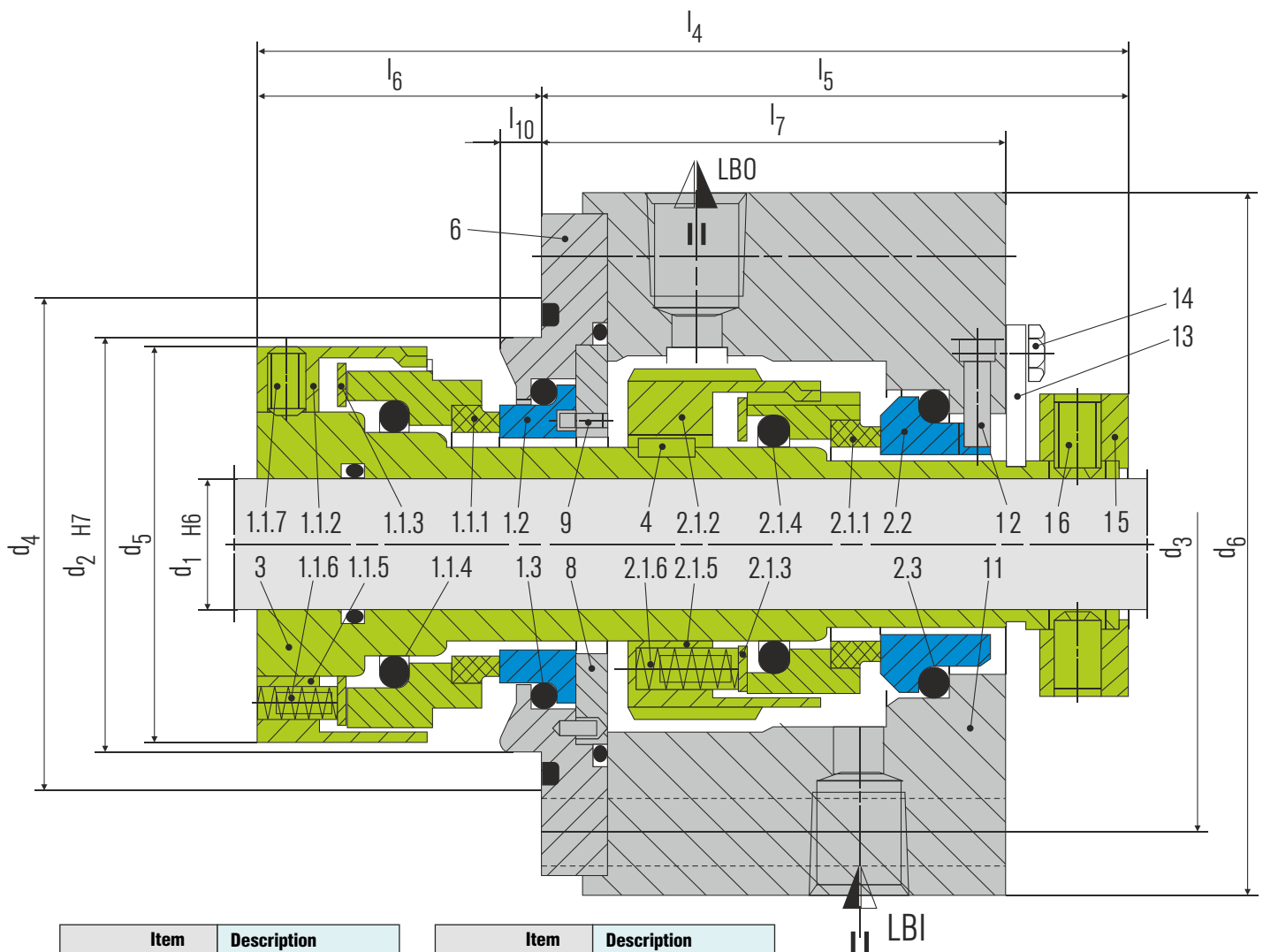


### Product Description

1. Bi-directional design available
2. Cartridge unit
3. Category 2 and 3, Type A, Arrangement 2 or 3
4. Design acc. to API 682 / ISO 21 049
5. Dual seal
6. Integrated pumping device available
7. Rotating multiple springs
8. Suitable for pressure reversals

### Technical Features

1. Extended field of operation in terms of temperature and pressure
2. Fits to any seal chamber
3. Metal parts also in special materials available
4. Optimized torque transmission
5. Safe operation due to metal torque transmission at the rotating seat



Item	Description
1.1.1, 2.1.1	Seal face
1.1.2, 2.1.2	Driver
1.1.3, 2.1.3	Thrust ring
1.1.4, 2.1.4, 1.3, 2.3	O-Ring
1.1.5, 2.1.5	Sleeve
1.1.6, 2.1.6	Spring
1.1.7	Set screw
1.2, 2.2	Seat
3	Shaft sleeve
4	Key

Item	Description
6	Adapter
8	Washer
9	Pin
11	Housing
12	HSH cap screw
13	Assembly fixture
14	Hexagon bolt
15	Set ring
16	Set screw

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## Typical Industrial Applications

Light volatile and highly viscous hydrocarbons  
 Oil and gas industry  
 Petrochemical industry  
 Refining technology  
 API 610 / ISO 13709 pumps  
 Process pumps

## Performance Capabilities

Sizes:  $d = \text{Upto } 110 \text{ mm (Upto } 4.250\text{")}$ \*  
 Pressure:  $p_1 = 40 \text{ bar (580 PSI)}$   
 Temperature:  $t = -40 \text{ }^\circ\text{C} \dots +220 \text{ }^\circ\text{C (-40 }^\circ\text{F} \dots 428 \text{ }^\circ\text{F)}$   
 Speed =  $23 \text{ m/s (75 ft/s)}$   
 Permissible axial movement:  $\pm 2.0 \dots 4.0 \text{ mm}$   
 depending on diameter and installation situation

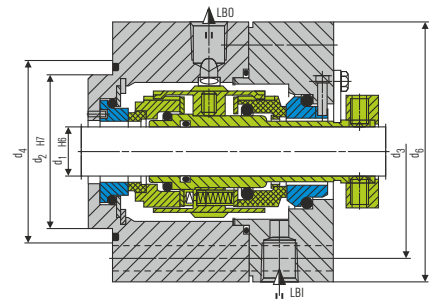
## Standards

API 682 / ISO 21049

## Materials

Seal face: Carbon graphite antimony impregnated (A), Silicon carbide (Q1, Q2)  
 Seat: Silicon carbide (Q1, Q2)  
 Secondary seals: EPDM (E), NBR (P), FKM (V), FFKM (K)  
 Springs: Hastelloy® C-4 (M)  
 Metal parts: CrNiMo steel (G), Duplex (G1), Hastelloy® C-4 (M)

## Design Variations



### HFA-VK-D

Dual seal in back-to-back arrangement. Suitable for API 610 table 6 seal chambers.

## Dimensional Data

### Dimensions in inch

API/d <sub>1</sub>	API/d <sub>2</sub>	API/d <sub>3</sub>	d <sub>6</sub>	l <sub>4</sub>	l <sub>5</sub>	l <sub>6</sub>	l <sub>7</sub>
0.750	2.756	4.134	5.079	5.669	3.819	1.850	3.189
1.125	3.150	4.528	5.472	5.728	3.780	1.949	3.051
1.500	3.543	4.921	5.866	5.768	3.799	1.969	3.071
2.000	3.937	5.512	6.614	6.220	4.193	2.028	3.465
2.250	4.724	6.299	7.402	6.496	4.232	2.264	3.551
2.750	5.118	6.693	7.795	6.693	4.232	2.461	3.346
3.125	5.512	7.087	8.189	6.890	4.232	2.657	3.346
3.500	6.299	8.071	9.370	7.039	4.602	2.437	3.717
3.750	6.693	8.465	9.764	7.283	4.626	2.657	3.622
4.250	7.087	8.858	10.157	7.402	4.587	2.815	3.583

\* For larger installation space an axial movement of  $\pm 0.118\text{''}$  is possible

### Dimensions in millimeter

API/d <sub>1</sub>	API/d <sub>2</sub>	API/d <sub>3</sub>	d <sub>6</sub>	l <sub>4</sub>	l <sub>5</sub>	l <sub>6</sub>	l <sub>7</sub>
20	70	105	129	144.0	97.0	47.0	81.0
30	80	115	139	145.5	96.0	49.5	77.5
40	90	125	149	146.5	96.5	50.0	78.0
50	100	140	168	158.0	106.5	51.5	88.0
60	120	160	188	165.0	107.5	57.5	90.2
70	130	170	198	170.0	107.5	62.5	85.0
80	140	180	208	175.0	107.5	67.5	85.0
90	160	205	238	178.8	116.9	61.9	94.4
100	170	215	248	185.0	117.5	67.5	92.0
110	180	225	258	188.0	116.5	71.5	91.0

\* For larger installation space an axial movement of  $\pm 3.0 \text{ mm}$  is possible

Note: Additional technical & dimensional information will be provided on request.

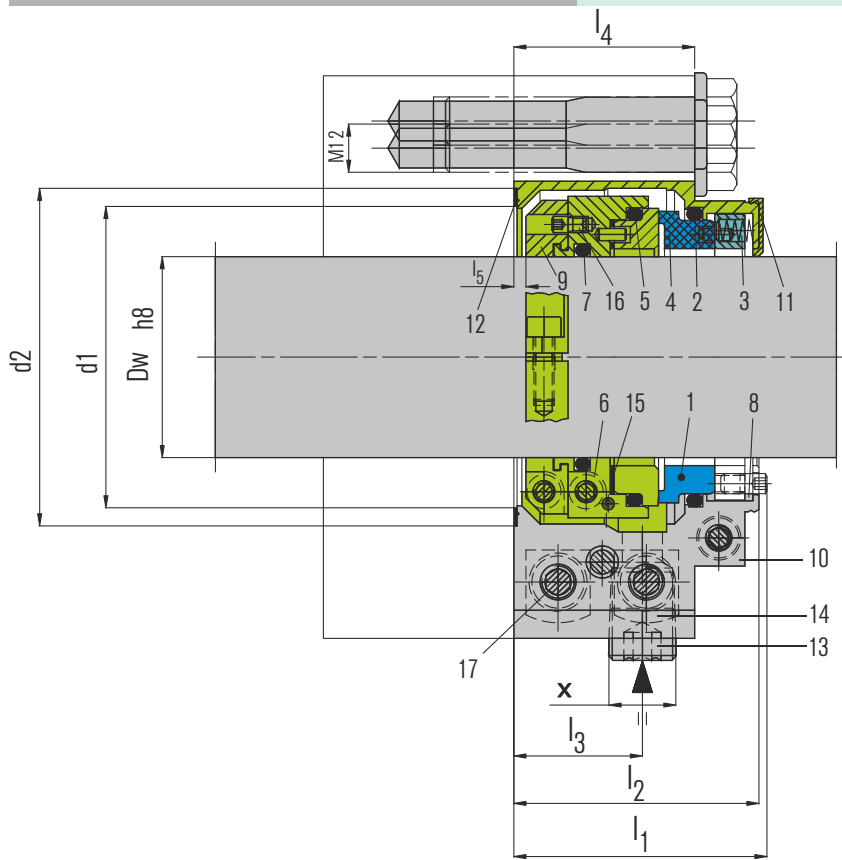


**Product Description**

1. Balanced
2. Bi-directional
3. Built-in flushing connections
4. External pressurization
5. Fully split single seal, 2 x 2 segments, preassembled
6. Installation and wear control
7. Semi-cartridge
8. Stationary springs

**Technical Features**

1. Dependable operation: mechanical decoupling of clamping ring (torque transmission) avoids distortion of the seat.
2. Greater flexibility during installation: no modification necessary because the seal is located outside of the stuffing box.
3. High tolerance to shaft deflections ensured by stationary design and elastic seat mounting (gasket).
4. Low leakage: elimination of secondary seals eliminates leakage paths between split components.
5. Shaft protection: uniform torque transmission via clamping ring prevents damage caused by set screws.
6. Springs which are protected from the product prevent clogging.



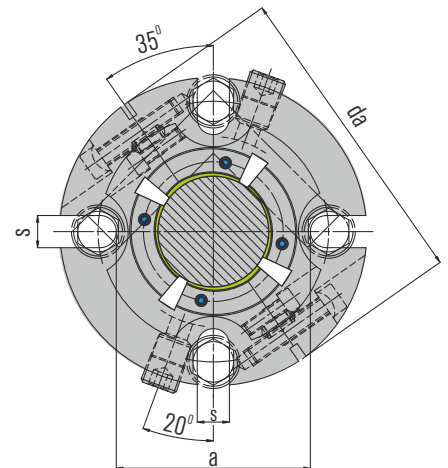
**Performance Capabilities**

Shaft diameter:  $d1 =$  Upto ... 150 mm (Upto ... 6.000")  
 Pressure:  $p1 =$  10 bar (145 PSI)  
 Temperature:  $t =$  -40 ... +150 °C (- 40 ... + 300 °F), above 80 °C (175 °F) flush is recommended  
 Sliding velocity:  $Vg =$  10 m/s (33 ft/s)  
 Axial movement:  $\pm$  1.5 mm (1/16")  
 Radial movement:  $\pm$  0.8 mm (1/32")

**Materials**

Seal face: Carbon graphite antimony impregnated (A), Silicon carbide (Q6)  
 Seat: Silicon carbide (Q6)  
 Secondary seals: FKM (V), EPDM (E), NBR(P)  
 Springs: CrNiMo steel (G)  
 Metal parts: CrNiMo steel (G)

**Design Variations**



**Typical Industrial Applications**

- Agitators
- Chemical Industry
- Centrifugal pumps
- Conveying pulp with stock pumps
- Cooling water pumps for energy generation
- Conveying timber to refiners with pumping screws
- Circulation of pulp-and-water mixtures in storage vessels
- Displacement pumps
- Process industry
- Petrochemical Industry
- Power Plant Technology
- Pulp and paper industry
- Pump stations for waste water treatment

Item	Description
1	Seal face
2, 5, 7	O-Ring
3	Spring
4	Seat
6	Driver
8	Thrust ring
9	Clamp collar
10	Housing
11	Assembly fixture
12, 15	Gasket
13	Head screw plug
14	Mounting plate
16	Set screw
17	Socket head screw

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## Dimensions

### Dimensions in inch

d <sub>w</sub>	d <sub>1</sub>	d <sub>2</sub>	d <sub>a</sub>	a	s	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>5</sub>	X
2.000	2.953	3.307	5.433	3.456	0.591	2.480	2.402	1.181	1.772	0.118	3/8 NPT
2.125	3.110	3.465	5.787	3.622	0.591	2.480	2.402	1.142	1.772	0.118	3/8 NPT
2.375	3.504	3.976	5.866	4.134	0.689	2.520	2.441	1.181	1.811	0.118	3/8 NPT
2.500	3.642	4.114	6.181	4.272	0.689	2.520	2.441	1.181	1.811	0.118	3/8 NPT
2.750	3.858	4.449	6.929	4.646	0.787	2.520	2.441	1.181	1.811	0.118	3/8 NPT
3.000	4.213	4.803	7.559	5.000	0.787	2.559	2.480	1.299	1.850	0.118	3/8 NPT
3.250	4.331	5.197	7.520	5.315	0.787	2.559	2.480	1.220	1.850	0.118	3/8 NPT
3.500	4.764	5.512	7.992	5.709	0.866	2.854	2.776	1.240	1.988	0.118	1/2 NPT
3.750	4.921	5.630	8.110	5.827	0.866	2.854	2.776	1.240	1.988	0.118	1/2 NPT
4.000	5.157	5.906	8.504	6.102	0.866	2.854	2.776	1.240	1.988	0.118	1/2 NPT
4.250	5.591	6.496	9.055	6.693	0.866	2.854	2.776	1.240	1.988	0.118	1/2 NPT
4.500	5.984	6.890	9.449	7.087	0.866	2.854	2.776	1.240	1.988	0.118	1/2 NPT
4.750	5.984	6.890	9.449	7.087	0.866	2.854	2.776	1.240	1.988	0.118	1/2 NPT
5.000	6.378	7.283	10.551	7.480	1.024	3.524	3.445	1.713	2.461	0.157	1/2 NPT
5.500	6.890	7.874	11.929	8.071	1.024	3.524	3.445	1.713	2.461	0.157	1/2 NPT
6.000	7.402	8.465	12.126	8.661	1.024	3.524	3.445	1.713	2.461	0.157	1/2 NPT

### Dimensions in millimeter

d <sub>w</sub>	d <sub>1</sub>	d <sub>2</sub>	d <sub>a</sub>	a	s	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>5</sub>	X
50	75	84	138	88	15	63	61	30	45	3	3/8 NPT
60	89	101	149	105	17,5	64	62	30	46	3	3/8 NPT
70	98	113	176	118	20	64	62	30	46	3	3/8 NPT
80	110	132	191	135	20	65	63	31	47	3	3/8 NPT
90	121	140	203	145	22	72.5	70.5	31.5	50.5	3	1/2 NPT
100	131	150	216	155	22	72.5	70.5	31.5	50.5	3	1/2 NPT
110	142	165	230	170	22	72.5	70.5	31.5	50.5	3	1/2 NPT
120	152	175	240	180	22	72.5	70.5	31.5	50.5	3	1/2 NPT
125	162	185	268	190	26	89.5	87.5	43.5	62.5	4	1/2 NPT
140	175	200	303	205	26	89.5	87.5	43.5	62	4	1/2 NPT
150	188	215	308	220	26	89.5	87.5	43.5	62.5	4	1/2 NPT

Note: Additional technical & dimensional information will be provided on request.

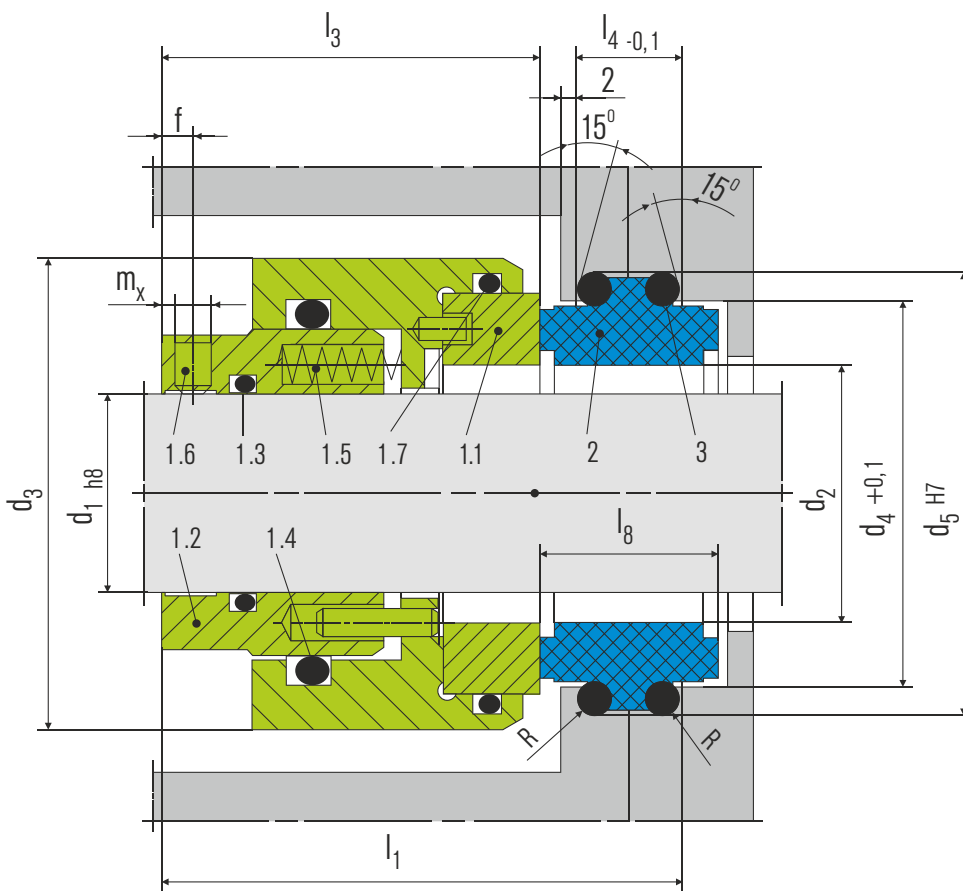


### Product Description

1. Balanced
2. For plain shafts
3. Independent of direction of rotation
4. Multiple springs rotating
5. Semi split single seal

### Technical Features

1. Economical: no complete dismantling of pump necessary
2. Reduction of down-times and installation times
3. Robust seal design
4. Split seat can be used on both sides
5. Springs are protected from the product



Item	Description
1.1	Seal face <sup>1)</sup>
1.2	Driver collar
1.3	O-Ring <sup>1)</sup>
1.4	O-Ring <sup>1)</sup>
1.5	Spring
1.6	Set screw
1.7	O-Ring <sup>1)</sup>
2	Stationary seat <sup>1)</sup>
3	O-Ring <sup>1)</sup>

1) For disassembly of unsplit seal faces, seats and O-Ring should be broken or cut.

### Typical Industrial Applications

Chest agitators  
Cooling water pumps  
Defibrators  
Gears  
Power plant technology  
Pulp and paper industry  
Sea water desalination  
Shipbuilding  
Stern tubes  
Water and waste water technology  
Water turbines

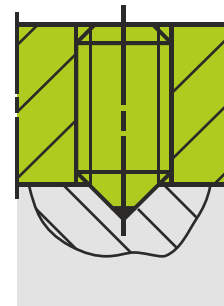
### Performance Capabilities

Sizes:  $d_1 =$  Upto 310 mm (Upto 12.250")  
Pressure:  $p_1 =$  25 bar (363 PSI)  
Temperature:  $t_1 =$  150 °C (302 °F)  
Speed = 20 m/s (66 ft/s)  
Permissible axial movement:  $\pm$  2.0 mm

### Materials

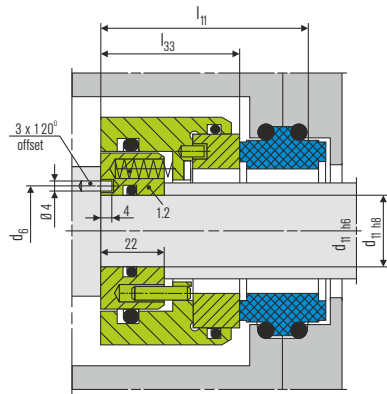
Seal face: Silicon carbide (Q1)  
Seat: Silicon carbide (Q1, Q2), Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B)  
Secondary seals: FKM (V), EPDM (E), NBR (P)  
Metal parts: CrNiMo steel (G)

### Torque Transmissions



$d_1 \geq 105$  mm  
Set screws with cone points 4 x offset by 90°

## Design Variations



### BGH211

Dimensions, items and descriptions as BGH201. Item 1.2 driver collar is modified for securing on stepped shafts. Unsplit as original equipment: Designation BGH210.

## Dimensional Data

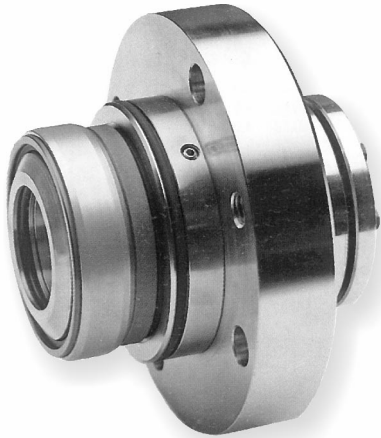
Dimensions in millimeter

d <sub>1</sub>	d <sub>11</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	d <sub>6</sub>	l <sub>1</sub>	l <sub>11</sub>	l <sub>3</sub>	l <sub>33</sub>	l <sub>4</sub>	l <sub>8</sub>	R	f	m <sub>x</sub>
50	40	60	95	80.5	89.6	55	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
55	45	65	100	85.5	94.6	60	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
60	50	70	105	90.5	99.6	65	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
65	55	75	110	95.5	104.6	70	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
70	60	80	115	100.5	109.6	75	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
75	65	85	120	105.5	114.6	80	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
80	70	90	125	110.5	119.6	85	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
85	75	95	130	115.5	124.6	90	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
90	80	100	135	120.5	129.6	95	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
95	85	105	140	125.5	134.6	100	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
100	90	110	145	130.5	139.6	105	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
105	95	115	150	135.5	144.6	110	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
110	100	120	155	140.5	149.6	115	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
115	105	125	160	145.5	154.6	120	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
120	110	130	165	150.5	159.6	125	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
125	115	135	170	155.5	164.6	130	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
130	120	140	175	160.5	169.6	135	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
135	125	145	180	165.5	174.6	140	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
140	130	150	185	170.5	179.6	145	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
145	135	155	190	175.5	184.6	150	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
150	140	160	195	180.5	189.6	155	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
155	145	165	200	185.5	194.6	160	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
160	150	170	205	190.5	199.6	165	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
165	155	175	210	195.5	204.6	170	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
170	160	180	215	200.5	209.6	175	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
175	165	185	220	205.5	214.6	180	95.3	75.3	70	50	18.8	31.8	2.5	6	M8
180	170	192	225	212.5	224.6	185	104.2	84.2	72	52	26.4	38.0	3.5	6	M8
185	175	197	230	217.5	229.6	190	104.2	84.2	72	52	26.4	38.0	3.5	6	M8
190	180	202	235	222.5	234.6	195	104.2	84.2	72	52	26.4	38.0	3.5	6	M8
195	185	207	240	227.5	239.6	200	104.2	84.2	72	52	26.4	38.0	3.5	6	M8
200	190	212	245	232.5	244.6	205	109.2	84.2	77	52	26.4	38.0	3.5	6	M10
205	195	217	255	237.5	249.6	210	109.2	84.2	77	52	26.4	38.0	3.5	8	M10
210	200	222	260	242.5	254.6	215	109.2	84.2	77	52	26.4	38.0	3.5	8	M10
220	210	232	270	252.5	264.6	225	109.2	84.2	77	52	26.4	38.0	3.5	8	M10
230	220	242	280	262.5	274.6	235	109.2	84.2	77	52	26.4	38.0	3.5	8	M10
240	230	252	290	272.5	284.6	245	109.2	84.2	77	52	26.4	38.0	3.5	8	M10
250	240	262	300	282.5	294.6	255	109.2	84.2	77	52	26.4	38.0	3.5	8	M10
260	250	272	310	292.5	304.6	265	109.2	84.2	77	52	26.4	38.0	3.5	8	M10
270	260	282	320	302.5	314.6	275	109.2	84.2	77	52	26.4	38.0	3.5	8	M10
280	270	292	330	312.5	324.6	285	109.2	84.2	77	52	26.4	38.0	3.5	8	M10
290	280	302	340	322.5	334.6	295	109.2	84.2	77	52	26.4	38.0	3.5	8	M10
300	290	312	350	332.5	344.6	305	109.2	84.2	77	52	26.4	38.0	3.5	8	M10
310	300	322	360	342.5	354.6	315	109.2	84.2	77	52	26.4	38.0	3.5	8	M10

d<sub>1</sub> > 310 on request

inch size available from size 2.000 to 12.250

Note: Additional technical & dimensional information will be provided on request.

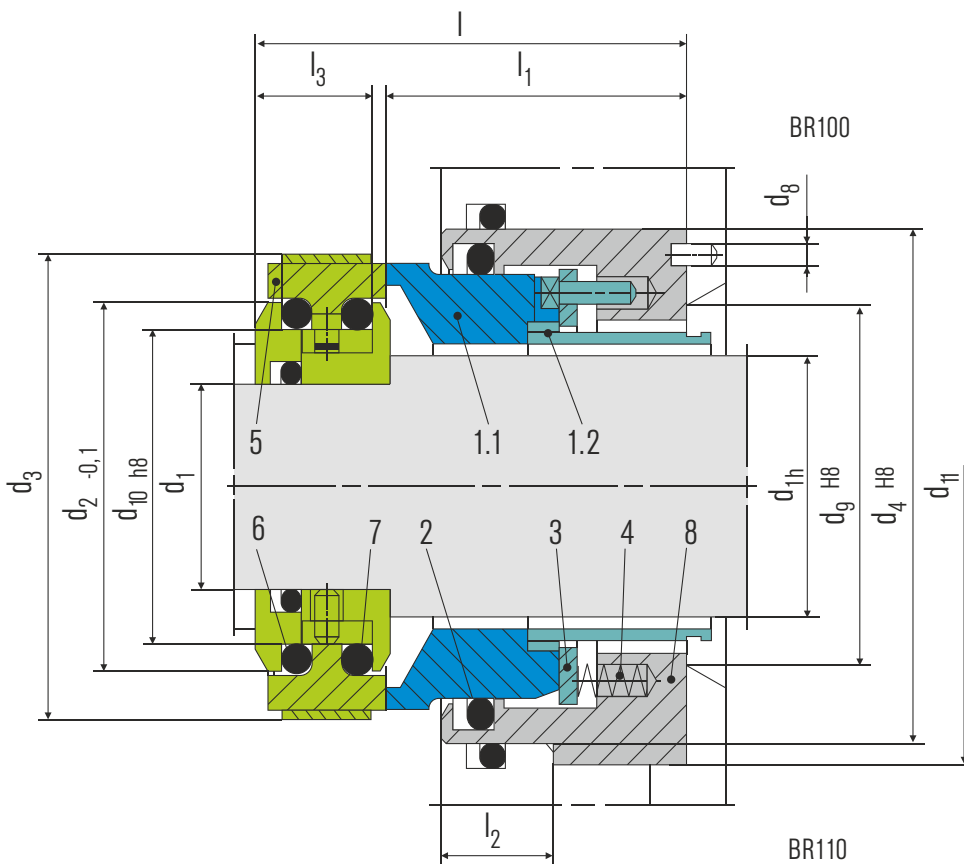


#### Product Description

1. Balanced
2. Dual seal as cartridge unit also available
3. Independent of direction of rotation
4. Multiple springs stationary
5. Seat arranged directly behind the impeller
6. Seat rotating
7. Single seal
8. Spring protection sleeve
9. Variant as cartridge with/without guide sleeve for application with/without quench

#### Technical Features

1. Accommodates shaft deflections due to stationary design
2. Especially for application for medias containing solids
3. No damage of the shaft by dynamically loaded O-Ring
4. Operation under vacuum without seat locking possible
5. Pumping screw for increased circulation available
6. Springs are protected from product and leakage



#### Typical Industrial Applications

Water and waste water technology  
 Dirty, abrasive and solids containing media  
 Dredger pumps  
 Mining industry  
 Oil and gas industry  
 Oil sand extraction plants (FGD)  
 Power plant technology  
 Pulp and paper industry  
 Sewage water pumps  
 Suspension pumps of flue-gas desulphurization

#### Performance Capabilities

Sizes:  $dN = \text{Upto } 270 \text{ mm (Upto } 10.625\text{'')}$   
 Pressure:  $p1^* = 16 \text{ bar (230 PSI)}$   
 Temperature:  $t = -20 \text{ }^\circ\text{C} \dots +160 \text{ }^\circ\text{C (-4 }^\circ\text{F} \dots +320 \text{ }^\circ\text{F)}$   
 Speed =  $10 \text{ m/s (33 ft/s)}$

#### Standards

EN 12756

#### Materials

Seal face: Silicon carbide (Q1, Q2)  
 Seat: Silicon carbide (Q1, Q2)

#### Notes

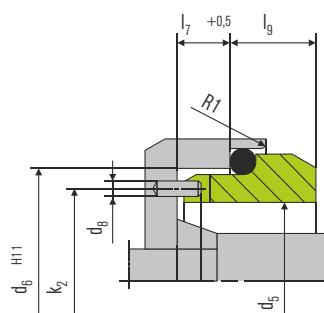
Direction of installation:  
 From the impeller side: BR100  
 From the bearing side: BR110

Item	Part no.	Description
1.1	472	Seal face
1.2	520	Sleeve
2	412.1	O-Ring
3	474	Thrust ring
4	477	Spring
5	475	Seat (G11)
6	412.2	O-Ring
7	412.3	O-Ring
8	441	Housing

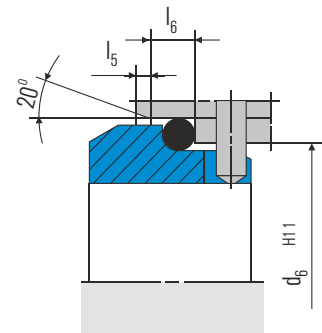
**DIN 24250**

Direction of installation: - from the impeller side BR100  
 from the bearing side BR110

#### Stationary Seats



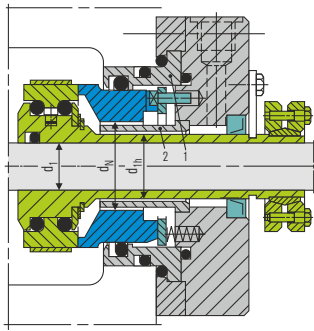
**G2**  
 (dN 36 ... 90 mm)



**G9**  
 (dN 95 ... 180 mm)

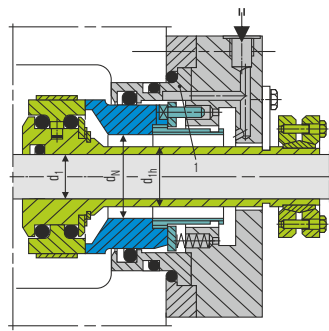


## Design Variations



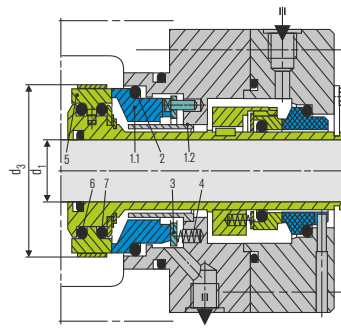
### BR200

Cartridge-type single seal with guide sleeve (Item no. 2) for use with quench. Insert (Item no. 1) either metal or silicon carbide.



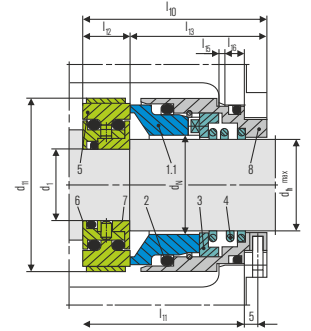
### BR300

Cartridge-type single seal. Insert (Item no. 1) either metal or silicon carbide. Optional without maintenance rinsing.



### BRKS-D

Double seal in cartridge design for operation in barrier or buffer pressure (does not open if barrier pressure fails), available alternatively with a pumping screw for a higher rate of circulation. Torque transmission e.g. by shrink disk.



### BRZ100

Single seal with cylindrical spring and type G76 seat. For installation in covers with installation dimensions according to EN 12756 B or U. Installation length  $l_{11}$  corresponds to max.  $l_{1k}$ . Intermediate sizes on request.

## Dimensional Data

### Dimensions in millimeter

d <sub>1</sub>	d <sub>1h</sub>	d <sub>N</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	d <sub>6</sub>	d <sub>7</sub>	d <sub>8</sub>	d <sub>9</sub>	d <sub>10</sub>	d <sub>11</sub> +0.2min	l	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>5</sub>	l <sub>6</sub>	l <sub>7</sub>	l <sub>9</sub>	k <sub>2</sub>	t	t <sub>1</sub>
20	28	36	47.1	65	70	46	56	63	4	40	38	75	75	53	20	19.5	17	10.5	6	9	8	51	4.5	3
25	33	41	52.1	70	75	51	62	70	4	45	43	80	75	53	20	19.5	17	10.5	6	9	9.5	56.5	4.5	3
28	38	46	57.1	75	80	56	67	75	4	50	48	85	75	53	20	19.5	17	10.5	6	9	9.5	61.5	4.5	3
33	43	51	62.1	80	85	61	72	80	4	55	53	90	75	53	20	19.5	17	10.5	6	9	10.5	66.5	4.5	3
38	48	56	67.1	85	90	66	77	85	4	60	58	95	75	53	20	19.5	17	10.5	6	9	10.5	71.5	4.5	3
43	53	61	72.1	90	95	69	81	90	4	65	63	100	75	53	20	19.5	17	10.5	7	9	11	75	4.5	3
48	58	66	77.1	95	100	76	88	97	4	70	68	105	75	53	20	19.5	17	10.5	7	9	11.5	82	4.5	3
53	63	71	82.1	101	105	81	95	105	4	75	73	110	75	53	20	19.5	17	10.5	7	9	11.5	88	4.5	3
55	65	75	87.1	106	110	86	100	110	4	79	78	115	75	53	20	19.5	17	10.5	7	9	11.5	93	4.5	3
60	70	80	92.1	111	115	91	105	115	4	84	83	120	75	53	20	19.5	17	10.5	7	9	13	98	4.5	3
65	75	85	97.1	116	120	96	110	120	4	89	88	125	75	53	20	19.5	17	10.5	7	9	13	103	4.5	3
70	80	90	102.1	121	125	101	115	125	4	94	93	130	75	53	20	19.5	17	10.5	7	9	13	108	4.5	3
75	85	95	107.1	126	130	107	122.2	134.3	5	99	98	135	75	53	20	19.5	17	10.5	10	12	20	114.5	7	3
80	90	100	112.1	131	135	107	122.2	134.3	5	104	103	140	75	53	20	19.5	17	10.5	10	12	20	114.5	7	3
90	100	110	126.1	147	155	117	136.2	148.3	5	116	117	163	98	73	30	22	19	16.0	10	12	20	126.5	7	4
100	110	120	136.1	157	165	132	146.2	158.3	5	126	127	173	98	73	30	22	19	16.0	10	12	20	139	7	4
110	120	130	145.1	167	175	142	156.2	168.3	5	136	136	183	98	73	30	22	19	16.0	10	12	20	149	7	4
120	130	140	154.1	177	185	152	168.2	180.3	5	146	145	193	98	73	30	22	19	16.0	10	12	22	160	7	4
130	140	150	163.9	188	195	162	178.2	190.3	5	156	155	203	98	73	30	22	19	16.0	12	12	24	170	7	4
140	150	160	174.9	189	205	172	188.2	200.3	5	166	166	213	98	73	30	22	19	16.0	12	12	24	180	7	4
160	170	180	193.9	220	230	187	212.5	224.3	5	186	185	238	98	73	30	22	19	16.0	12	12	28	199.5	7	4
180	190	200	213.9	240	255	-	-	-	-	206	205	265	98	73	30	22	19	16.0	-	-	-	-	-	4
190	200	210	231.9	255	270	-	-	-	-	218	220	280	115	83	40	28.35	24.7	19.0	-	-	-	-	-	5
200	210	220	241.9	265	280	-	-	-	-	228	230	290	115	83	40	28.35	24.7	19.0	-	-	-	-	-	5
210	220	230	251.9	275	290	-	-	-	-	238	240	300	115	83	40	28.35	24.7	19.0	-	-	-	-	-	5
220	230	240	261.9	285	300	-	-	-	-	248	250	310	115	83	40	28.35	24.7	19.0	-	-	-	-	-	5
230	240	250	271.9	295	310	-	-	-	-	258	260	320	115	83	40	28.35	24.7	19.0	-	-	-	-	-	5
250	260	270	291.9	315	330	-	-	-	-	278	280	340	115	83	40	28.35	24.7	19.0	-	-	-	-	-	5

### BRZ100 Dimensional Data

#### Dimensions in millimeter

d <sub>N</sub>	d <sub>1h</sub>	d <sub>1</sub>	d <sub>11</sub>	d <sub>12</sub>	d <sub>13</sub>	d <sub>14</sub>	l <sub>10</sub>	l <sub>11</sub>	l <sub>12</sub>	l <sub>13</sub>	l <sub>15</sub>	l <sub>16</sub>
35	33	20	56	42	48	3	57.7	49.2	15	42.7	2	5
43	39	27	67	54	61	4	57.7	49.2	15	42.7	2	6
54	50	35	78	65	73	4	59.8	52.1	15.5	44.3	2.5	6
66	60	47	91	77	85	4	66	58	16.5	49.5	2.5	6
77	72	55	103	88	97	4	74.5	66	17.5	57	2.5	7
100	90	70	125	110	120	4	82	73	21	61	3	7

Dimensions for shaft diameters from 250 mm on request.

inch size available from size 0.750 to 10.625

Note: Additional technical & dimensional information will be provided on request.

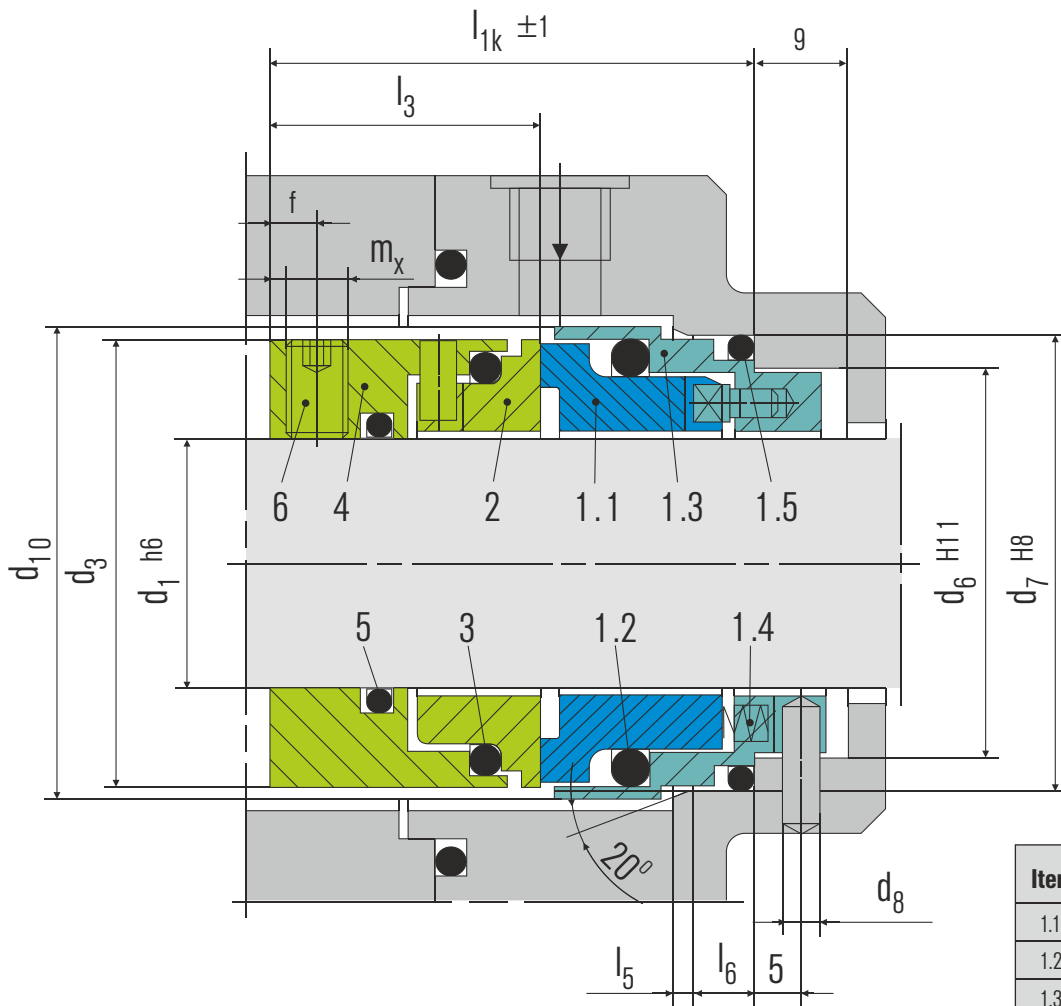


**Product Description**

1. Balanced
2. Dual seals in tandem as well as back-to-back arrangements also available
3. Independent of direction of rotation
4. Single seal
5. Stationary springs

**Technical Features**

1. Adjusts to shaft movements because of the stationary design
2. Balanced seal even with plain shafts
3. No damage of the shaft by a dynamically loaded O-Ring
4. Operation in vacuum without additional seat locking possible
5. Safe operation
6. Small installation sizes
7. Spring unit isolated from the product so no sticking and clogging of the springs
8. Suitable for pressure reversals
9. Suitable for solid containing and abrasive media



Item	Part no.	Description
1.1	472	Seal face
1.2	412.1	O-Ring
1.3	485	Retainer
1.4	477	Spring
1.5	412.2	O-Ring
2	475	Seat
3	412.3	O-Ring
4	485	Drive collar
5	412.4	O-Ring
6	904	Set screw

**DIN 24250**

# DIE DICHTUNGS - COMPANY

## Typical Industrial Applications

Chemical industry  
 Dirty, abrasive and solid containing media  
 Fugitive hydrocarbons  
 Refining technology  
 Sticky and stringy media  
 Water and waste water technology  
 Chemical standard pumps  
 Sewage pumps

## Performance Capabilities

Sizes: d = Upto 100 mm (Upto 4.000")  
 Pressure: p1\*) = 25 bar (363 PSI)  
 Temperature: t = -40 °C .. +220 °C (-40 °F .. 428 °F)  
 Speed = 20 m/s (66 ft/s)  
 Permissible axial movement: ± 1.0 mm

## Materials

Seal face: Carbon graphite resin impregnated (B), Silicon carbide (Q1)  
 Seat: Silicon carbide (Q1)  
 Secondary seals: FKM (V), NBR (P), FFKM (K), PTFE (T)  
 Springs: Hastelloy® C-4 (M)  
 Metal parts: CrNiMo steel (G)

## Standards

EN 12756

## Dimensional Data

Dimensions in millimeter

d <sub>1</sub>	d <sub>3</sub>	d <sub>6</sub>	d <sub>7</sub>	d <sub>8</sub>	d <sub>10</sub>	l <sub>1k</sub>	l <sub>3</sub>	l <sub>5</sub>	l <sub>6</sub>	f	m <sub>x</sub>
18	33	27	33	3	34.7	37.5	19.5	2.0	5	3.0	4
20	35	29	35	3	36.7	37.5	19.5	2.0	5	3.0	4
22	37	31	37	3	38.7	37.5	19.5	2.0	5	3.0	4
24	39	33	39	3	40.7	40.0	20.5	2.0	5	3.5	5
25	40	34	40	3	41.7	40.0	20.5	2.0	5	3.5	5
28	43	37	43	3	44.7	42.5	21.5	2.0	5	3.5	5
30	45	39	45	3	46.7	42.5	21.5	2.0	5	3.5	5
32	48	42	48	3	49.7	42.5	21.5	2.0	5	3.5	5
33	48	42	48	3	49.7	42.5	21.5	2.0	5	3.5	5
35	50	44	50	3	51.7	42.5	21.5	2.0	5	3.5	5
38	56	49	56	4	57.7	45.0	24.0	2.0	6	4.0	6
40	58	51	58	4	59.7	45.0	24.0	2.0	6	4.0	6
43	61	54	61	4	62.7	45.0	24.0	2.0	6	4.0	6
45	63	56	63	4	64.7	45.0	24.0	2.0	6	4.0	6
48	66	59	66	4	67.7	45.0	24.0	2.0	6	4.0	6
50	70	62	70	4	71.7	47.5	25.0	2.5	6	4.0	6
53	73	65	73	4	74.7	47.5	25.0	2.5	6	4.0	6
55	75	67	75	4	76.7	47.5	25.0	2.5	6	4.0	6
58	78	70	78	4	80.5	52.5	28.0	2.5	6	4.0	6
60	80	72	80	4	82.5	52.5	28.0	2.5	6	4.0	6
63	83	75	83	4	85.5	52.5	28.0	2.5	6	4.0	6
65	85	77	85	4	87.5	52.5	28.0	2.5	6	4.0	6
68	90	81	90	4	92.5	52.5	28.0	2.5	7	4.0	6
70	92	83	92	4	94.5	60.0	34.0	2.5	7	6.0	8
75	97	88	97	4	100.5	60.0	34.0	2.5	7	6.0	8
80	105	95	105	4	108.5	60.0	34.0	3.0	7	6.0	8
85	110	100	110	4	113.5	60.0	34.0	3.0	7	6.0	8
90	115	105	115	4	118.5	65.0	39.0	3.0	7	10.0	8
95	120	110	120	4	123.5	65.0	39.0	3.0	7	10.0	8
100	125	115	125	4	128.5	65.0	39.0	3.0	7	10.0	8

inch size available from size 0.750 to 4.000

Note: Additional technical & dimensional information will be provided on request.

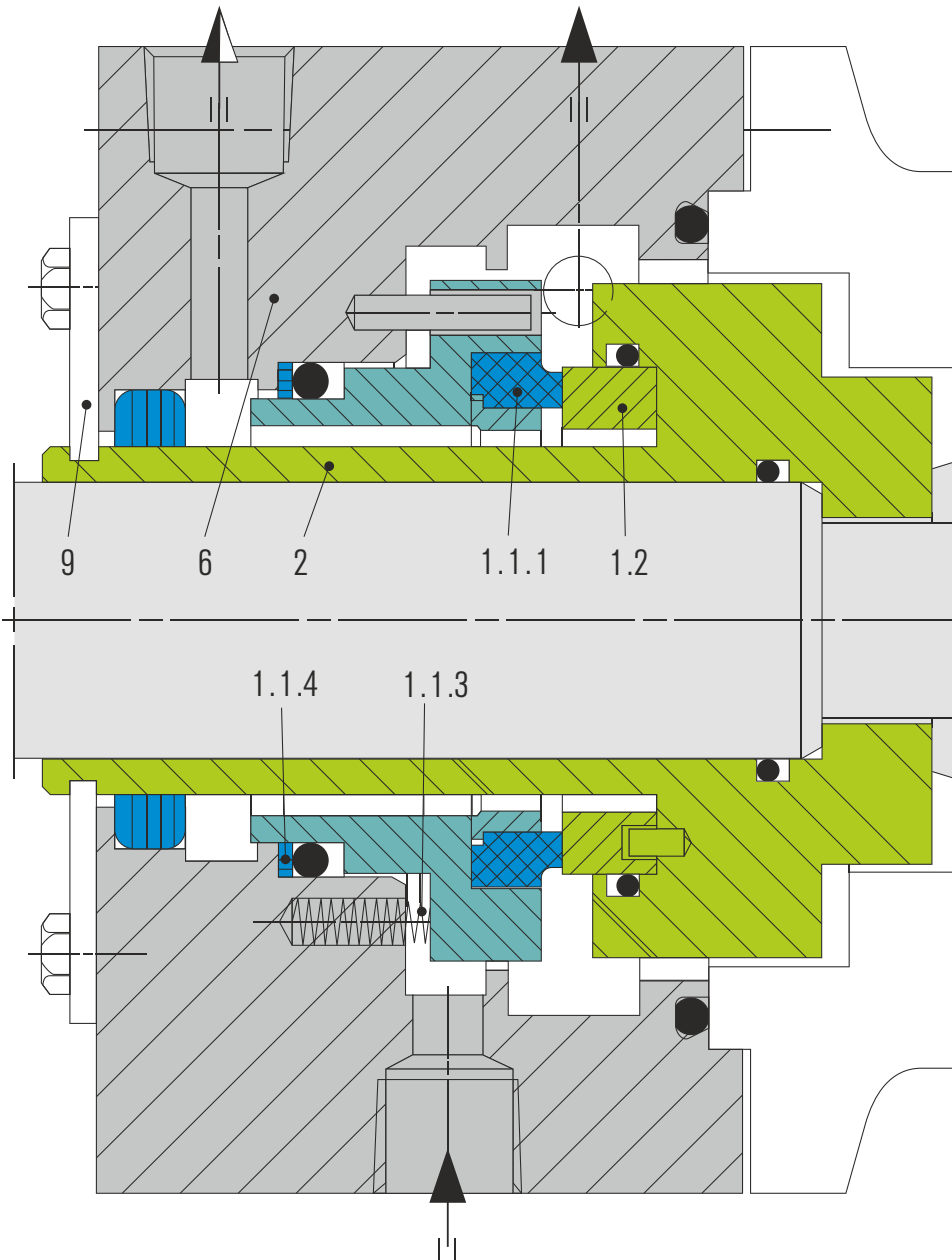


### Product Description

1. Balanced
2. Cartridge design
3. Dependent of direction of rotation
4. Integrated pumping device
5. Multiple springs
6. Single seal
7. Stationary spring loaded unit
8. Shrink-fitted seal face

### Technical Features

1. Deformation-optimized seal for highest pressure levels
2. Economical due to standardized inner components
3. High flexibility due to adaptation of the connection parts to the pump seal chamber
4. Insensitive to shaft deflections due to stationary design
5. Optimum heat dissipation due to integrated pumping device and optimized seat design
6. Only small number of components
7. Pre-assembled unit for quick and easy installation



### Typical Industrial Applications

Amines	Injection pumps
Caustic soda	Multi-phase pumps
Chemical industry	Oil and gas industry
Crude oil	Process water
Crystallizing media	Refining technology
Crude oil feed pumps	Sour water
Hot water	

### Standards

API 682 / ISO 21049

### Performance Capabilities

Sizes:  $d1^* =$  Upto 250 mm (Upto 10.000")  
 Pressure:  $p_1 = 150$  bar (2,175 PSI)  
 Temperature:  $t = 300$  °C (572 °F)  
 Speed = 60 m/s (197 ft/s)  
 Permissible axial movement:  $\pm 3$  mm

### Materials

Seal face: SiC-C-Si silicon impregnated carbon (Q3), Carbon graphite antimony impregnated (A)  
 Seat: Silicon carbide (Q)  
 Secondary seals: FKM (V), EPDM (E), FFKM (K)  
 Springs: Hastelloy® C-4 (M)  
 Metal parts: CrNiMo steel (G), Duplex (G1), Super Duplex (G4), Titanium (T2), Hastelloy® C-4 (M)

### Design Variations

#### SBFV

Same design as SBPV but with pumping screw

Item	Description
1.1.1	Seal face pressure-stabilized
1.1.3	Spring
1.1.4	Back-up ring
1.2	Seat
2	Seat housing with pumping screw (F) or pumping ring (P)
6	Cover
9	Assembly fixture

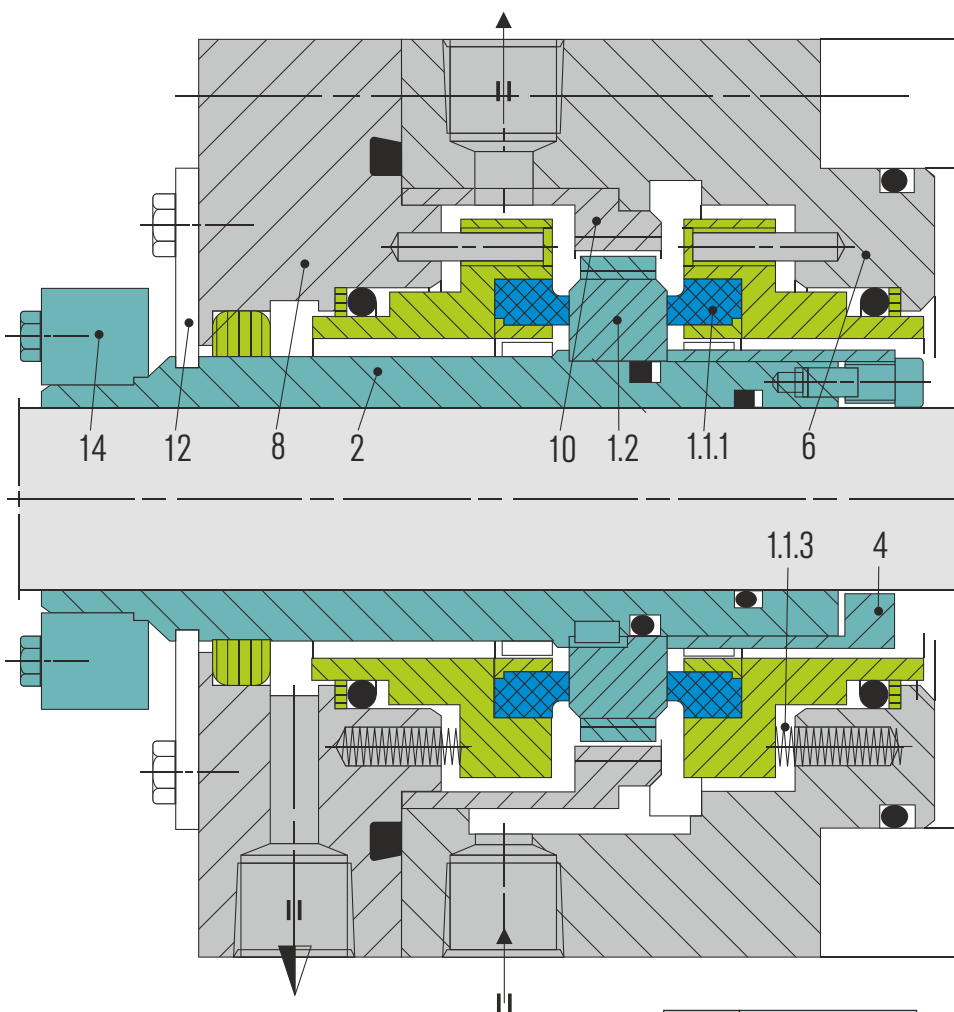


### Product Description

1. Balanced
2. Cartridge design
3. Dual seal
4. Integrated pumping device
5. Multiple springs arrangement
6. Shrink-fitted seal face
7. Single robust stationary seat
8. Stationary spring loaded unit

### Technical Features

1. Accommodates shaft deflections due to stationary design
2. Cost effective due to standardized inner components
3. High flexibility due to adaptation of the connection parts to the pump seal chamber
4. Optimum heat dissipation due to integrated pumping device and optimized seat design
5. Pre-assembled unit for quick and easy installation
6. Reliable operation due to single robust seat with bandage
7. Suitable for high sliding velocities and medium pressures
8. Suitable for use in compliance with API 682, type ES
9. Versatile application for OEM or retrofits of boiler feed water pumps
10. Version with loose-fitted seal face available, for extreme applications



Item	Description
1.1.1	Seal face
1.1.3	Spring
1.2	Seat
2	Shaft sleeve
4	Clamping sleeve
6	Housing
8	Cover
10	Pumping sleeve
12	Assembly fixture
14	Shrink disk

### Typical Industrial Applications

Chemical industry  
 Crude oil  
 Crude oil feed pumps  
 Injection pumps  
 Multi-phase pumps  
 Oil and gas industry  
 Process water  
 Refining technology  
 Volatile and non-volatile hydrocarbons

### Standards

API 682 / ISO 21049

### Performance Capabilities

Sizes:  $d_1^* =$  Upto 250 mm (Upto 10.000")  
 Pressure:  $p_3 =$  150 bar (2,175 PSI)  
 Temperature:  $t =$  200 °C (392 °F)  
 Speed = 60 m/s (197 ft/s)

### Materials

Seal face: SiC-C-Si, silicon impregnated carbon (Q3), Carbon graphite antimony impregnated (A)  
 Seat: Silicon carbide (Q)  
 Secondary seals: FKM (V), EPDM (E), FFKM (K)  
 Springs: Hastelloy® C-4 (M)  
 Metal parts: CrNiMo steel (G), Duplex (G1), Super Duplex (G4), Pure Titanium (T2), Hastelloy® C-4 (M)

### Design Variations

#### SBF(V)1-D / SBP(V)1-D

Same design as SBF(V)-D / SBP(V)-D but with loosely inserted seal face for extreme applications.  
 Pressure:  $p_1 =$  200 bar (2900 PSI)

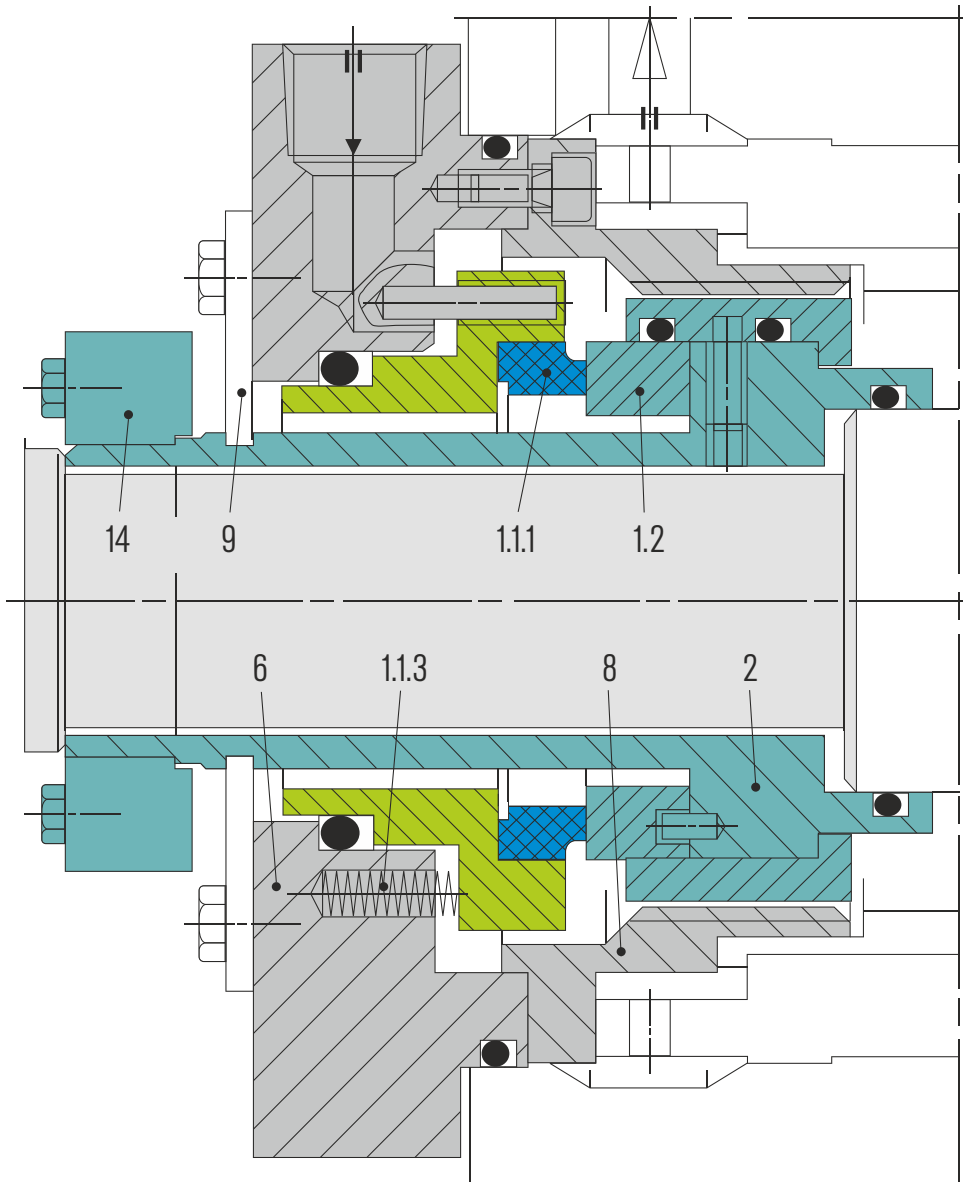


### Product Description

1. Balanced
2. Cartridge design
3. Dependent of direction of rotation
4. Integrated pumping device
5. Multiple springs
6. Shrink-fitted seal face
7. Single seal
8. Stationary spring loaded unit

### Technical Features

1. Suitable for high sliding velocities and medium pressures
2. Accommodates shaft deflections due to stationary design
3. Cost effective due to standardized inner components
4. High flexibility due to adaptation of the connection parts to the pump seal chamber
5. Optimum heat dissipation due to integrated pumping device and optimized seat design
6. Pre-assembled unit for quick and easy installation
7. Versatile application for OEM or retrofits of boiler feed water pumps



### Typical Industrial Applications

Boiler feed water pumps  
Power plant technology

### Performance Capabilities

Sizes:  $d1^*$  = Upto 250 mm (Upto 10.000")  
Pressure:  $p_1$  = 50 bar (725 PSI)  
Temperature:  $t$  = 300 °C (572 °F)  
Speed = 60 m/s (197 ft/s)  
Permissible axial movement:  $\pm 3$  mm

### Materials

Seal face: Silicon carbide (Q), Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B)  
Seat: Silicon carbide  
Secondary seals: EPDM (E), FFKM (K)  
Springs: CrNiMo steel (G)  
Metal parts: CrNiMo steel (G)

### Design Variations

#### SBF4

Single Mechanical Seal with integrated jacket cooling, for boiler feed pumps

Item	Description
1.1.1	Seal face
1.1.3	Spring
1.2	Seat
2	Shaft sleeve
6	Cover
8	Pumping screw with flow guide
9	Assembly fixture
14	Shrink disk



### Product Description

1. Balanced
2. Independent of direction of rotation
3. Single seal
4. Stationary multiple springs

### Technical Features

1. Compact ready-to-install unit
2. High pressure capability
3. No damage of the shaft by dynamically loaded O-Ring
4. Stationary design allows shaft misalignments
5. Suitable for solids in the medium
6. Very short axial installation length

### Typical Industrial Applications

All seal chambers with a very short axial installation length  
 Bearing seal  
 Lube oils  
 Process industry  
 Roller seal

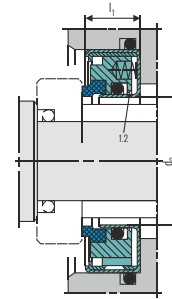
### Performance Capabilities

Sizes:  $d_1 =$  Upto 100 mm (Upto 4.000")  
 Pressure:  $p_1 = 25$  bar (363 PSI)  
 Temperature:  $t = -40 \dots +180$  °C (-40 °F ... 356 °F)  
 Speed = 50 m/s (164 ft/s)

### Materials

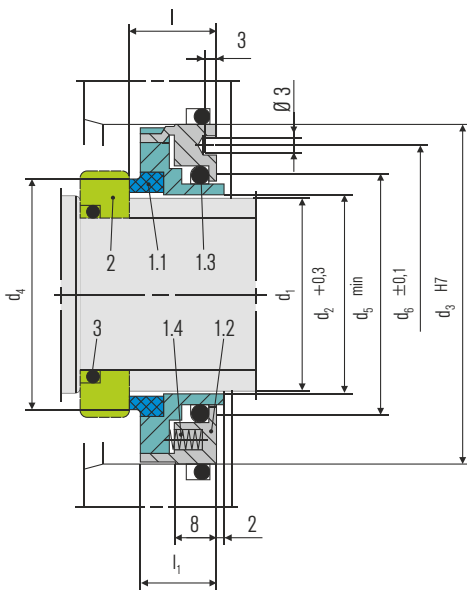
Seal face: Carbon graphite antimony impregnated (A),  
 Carbon graphite resin impregnated (B)

### Design Variations



### 100

Dimensions, items and description as BAA. Drive collars and housings for item 1.2 are made of deepdrawn stainless steel sheet.



### Dimensional Data

Dimensions in millimeter

$d_1$	$d_2$	$d_2'$	$d_3$	$d_4$	$d_5$	$d_6$	$l$	$l_1$	$l_1'$
15	16	17	42	22.6	21	34	17	15.0	16
18	19	-	45	25.6	24	37	17	15.0	-
20	21	22	48	27.6	26	40	17	15.0	16
22	23	24	50	29.6	28	42	17	15.0	16
25	26	27	52	32.8	31	44	17	15.0	16
28	29	-	55	35.8	34	47	17	15.0	-
30	31	32	58	37.8	36	50	17	15.0	16
32	33	34	60	39.8	38	52	17	15.0	16
35	36	37	62	42.8	41	54	17	15.0	16
38	39	40	65	45.9	44	57	17	15.0	16
40	41	42	68	47.9	46	60	17	15.0	16
42	43	44	72	49.9	48	64	17	15.0	16
45	46	47	75	52.9	51	67	17	15.0	16
48	49	-	80	55.9	54	72	17	15.0	-
50	51	52	80	58.2	56	72	17	15.0	16
52	53	-	82	60.2	58	74	17	15.0	-
55	56	57	85	63.2	61	77	17	15.0	16
58	59	-	90	66.7	64	82	17	15.0	-
60	61	62	90	68.7	66	82	17	15.0	16
65	66	67	95	73.7	71	87	19	16.5	18
68	69	70	100	76.7	74	92	19	16.5	18
70	71	72	100	78.7	76	92	19	16.5	18
75	76	77	108	83.7	81	100	19	16.5	18
80	81	82	112	88.7	86	104	19	16.5	18
85	86	87	118	93.7	91	110	19	16.5	18
90	91	92	122	99.5	96	114	19	16.5	18
95	96	97	128	104.5	101	120	19	16.5	18
100	101	102	132	109.5	106	124	19	16.5	18

inch size available from size 0.750 to 4.000

Note: Additional technical & dimensional information will be provided on request.

Item	Part no.	Description
1.1	472	Seal face
	473	Seal face housing
1.2	485	Drive collar
1.3		O-Ring
1.4	477	Spring
2	475	Rotating seat*)
3	412.2	O-Ring

### DIN 24250

\*) The seat design is chosen according to the specific requirements and conditions of operation.

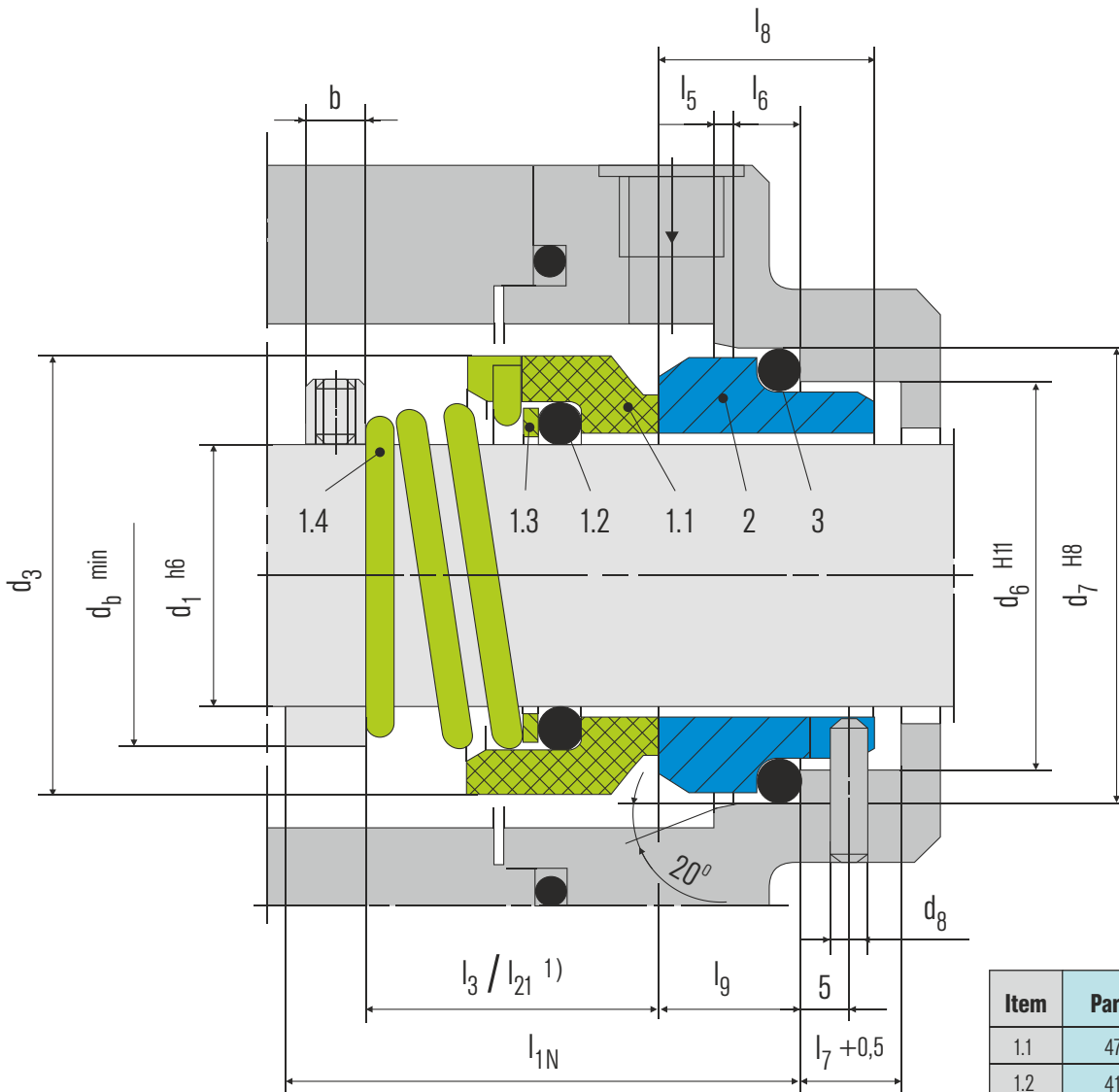


**Product Description**

1. Conical spring rotating
2. Dependent on direction of rotation
3. For plain shafts
4. Single seal
5. Unbalanced

**Technical Features**

1. Economical seal solution
2. No damage of the shaft by set screws
3. Short installation length possible



Item	Part no.	Description
1.1	472	Seal face
1.2	412.1	O-Ring
1.3	474	Thrust ring
1.4	478	Righthand spring
1.4	479	Lefthand spring
2	475	Seat (G9)
3	412.2	O-Ring

DIN 24250



## Typical Industrial Applications

Chemical industry  
 Food and beverage industry  
 Food processing  
 Pulp and paper industry  
 Water and waste water technology

## Performance Capabilities

Shaft diameter:  $d_1 =$  Upto 38 mm (Upto 1.500")  
 Pressure:  $p_1 =$  10 bar (145 PSI)  
 Temperature:  $t =$  -20 °C ... 140 °C (-4 °F ... 355 °F)  
 Sliding velocity:  $V_g =$  15 m/s (50 ft/s)  
 Permissible axial movement: 1.0 mm

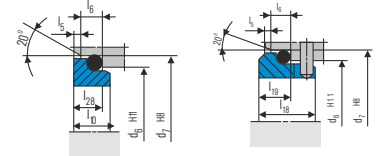
## Standards

EN 12756

## Notes

Seal face: Carbon graphite resin impregnated (B)  
 Seat G9: Silicon carbide (Q1, Q2),  
 Special cast CrMo steel (S), Aluminium oxide (V)

## Stationary Seats



**G4**  
(EN 12756)

**G6**  
(EN 12756)

## Design Variations

### CAA

Rotating unit CAA with seat G4 or G16 (shorter installation length).  
 Seal face: Carbon graphite resin impregnated (B)  
 Seat G4: Silicon carbide (Q1), Special cast CrMo steel (S)  
 Seat G16: Silicon carbide (Q1, Q2), Special cast CrMo steel (S), Aluminium oxide (V)

### XXX N4

Rotating unit CAA with seat G6.  
 Seal face: Carbon graphite resin impregnated (B)  
 Seat G6: Silicon carbide (Q1), Special cast CrMo steel (S)

## Dimensional Data

### Dimensions in millimeter

$d_1$	$d_3$	$d_6$	$d_7$	$d_8$	$d_{11}$	$d_{12}$	$d_b$	$l_{1N}$	$l_3^{(1)}$	$l_5$	$l_6$	$l_7$	$l_8$	$l_{10}$	$l_{12}$	$l_{14}$	$l_{15}$	$l_{16}$	$l_{18}$	$l_{19}$	$l_{21}^{(1)}$	$l_{28}$	$b$	$R$
6	15	-	-	-	11.8	16.0	8	-	-	-	-	-	-	-	6.5	5.6	1.2	3.8	-	-	10.9	-	-	1.2
8	18	-	-	-	15.5	19.2	11	-	-	-	-	-	-	-	8.0	7.0	1.2	3.8	-	-	15.5	-	-	1.2
10	20	17	21	3	15.5	19.2	13	40	17.5	1.5	4	8.5	17.5	7.5	7.5	6.6	1.2	3.8	-	-	15.9	6.6	8	1.2
12	22	19	23	3	17.5	21.6	16	40	17.5	1.5	4	8.5	17.5	7.5	8.0	7.0	1.2	3.8	-	-	16.0	6.6	8	1.2
14	25	21	25	3	20.5	24.6	18	40	17.5	1.5	4	8.5	17.5	7.5	8.0	7.0	1.2	3.8	-	-	16.0	6.6	8	1.2
15	27	-	-	-	20.5	24.6	19	-	-	-	-	-	-	-	7.5	6.6	1.2	3.8	-	-	17.4	-	-	1.2
16	27	23	27	3	22.0	28.0	21	40	19.5	1.5	4	8.5	17.5	7.5	8.5	7.5	1.5	5.0	-	-	19.0	6.6	8	1.5
18	30	27	33	3	24.0	30.0	23	45	20.5	2.0	5	9.0	19.5	8.5	9.0	8.0	1.5	5.0	15	7	20.5	7.5	8	1.5
20	32	29	35	3	29.5	35.0	26	45	22	2.0	5	9.0	19.5	8.5	8.5	7.5	1.5	5.0	15	7	22.0	7.5	8	1.5
22	35	31	37	3	29.5	35.0	28	45	23.5	2.0	5	9.0	19.5	8.5	8.5	7.5	1.5	5.0	15	7	23.5	7.5	8	1.5
24	38	33	39	3	32.0	38.0	30	50	25	2.0	5	9.0	19.5	8.5	8.5	7.5	1.5	5.0	15	7	25.0	7.5	8	1.5
25	40	34	40	3	32.0	38.0	31	50	26.5	2.0	5	9.0	19.5	8.5	8.5	7.5	1.5	5.0	15	7	26.5	7.5	8	1.5
26	41	-	-	-	34.0	40.0	32	-	-	-	-	-	-	-	9.0	8.0	1.5	5.0	-	-	26.5	-	-	1.5
28	43	37	43	3	36.0	42.0	35	50	26.5	2.0	5	9.0	19.5	8.5	10.0	9.0	1.5	5.0	15	7	26.5	7.5	8	1.5
30	47	-	-	-	39.2	45.0	37	-	-	-	-	-	-	-	11.5	10.5	1.5	5.0	15	7	25.0	-	-	1.5
32	48	-	-	-	42.2	48.0	39	-	-	-	-	-	-	-	13.0	10.5	1.5	5.0	15	7	28.5	-	-	1.5
35	53	-	-	-	46.2	52.0	43	-	-	-	-	-	-	-	13.5	11.0	1.5	5.0	15	7	28.5	-	-	1.5
38	56	-	-	-	49.2	55.0	47	-	-	-	-	-	-	-	13.0	10.3	1.5	5.0	16	8	32.0	-	-	1.5

1)  $l_3$  valid for CAA-13,  $l_{21}$  valid for CAA

According to EN 12756

inch sizes also available from size 0.250 to 1.500

Note: Additional technical & dimensional information will be provided on request.

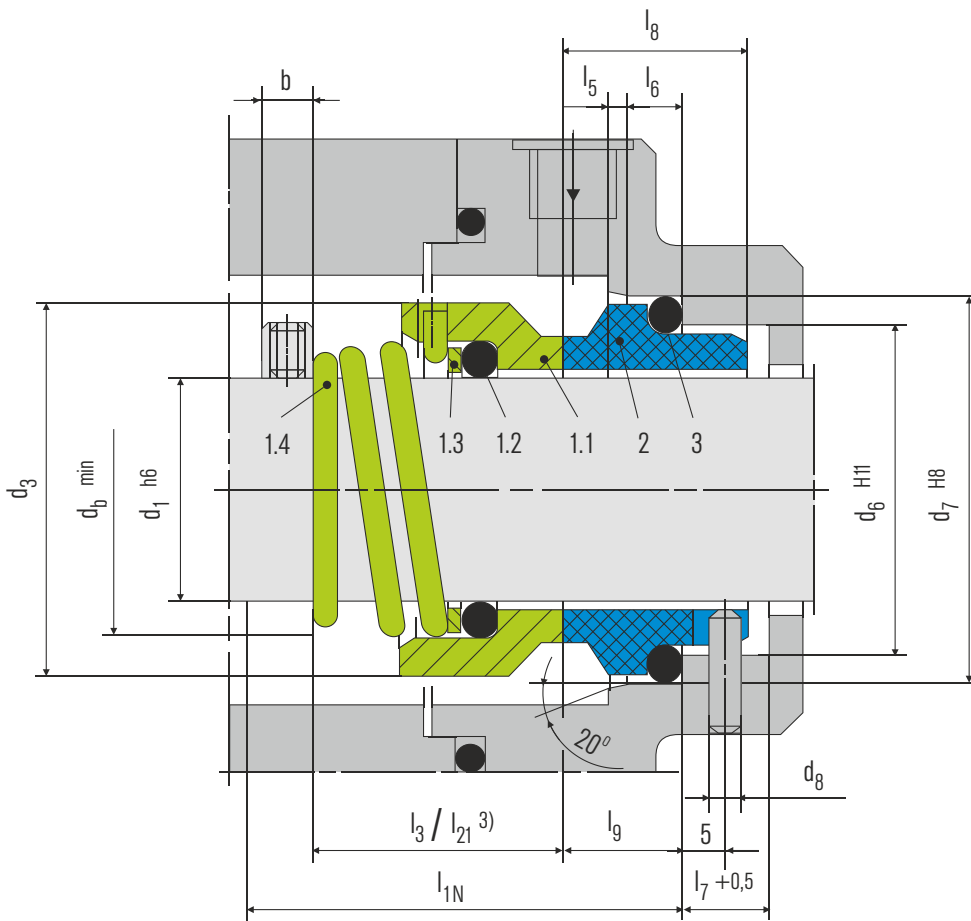


### Product Description

1. Dependent on direction of rotation
2. For plain shafts
3. Rotating conical spring
4. Single seal
5. Unbalanced

### Technical Features

1. Applicable for low solids content
2. No damage of the shaft by set screws
3. Short installation lengths also possible
4. Universal application possibilities



### Typical Industrial Applications

Chemical industry  
 Food and beverage industry  
 Process industry  
 Water and waste water technology  
 Chemical standard pumps  
 Eccentric screw pumps  
 Submersible pumps

### Materials

Seal face: Special cast CrMo steel (S)  
 Seat G9: Carbon graphite antimony impregnated (A),  
 Carbon graphite resin impregnated (B)

### Performance Capabilities

Sizes:  $d_1 =$  Upto 80 mm (Upto 3.125")  
 Pressure:  $p_1 =$  10 bar (145 PSI)  
 Temperature:  $t =$  -20 °C ... 180 °C (-4 °F ... 355 °F)  
 Speed:  $=$  15 m/s (50 ft/s)  
 Permissible axial movement: 1.0 mm

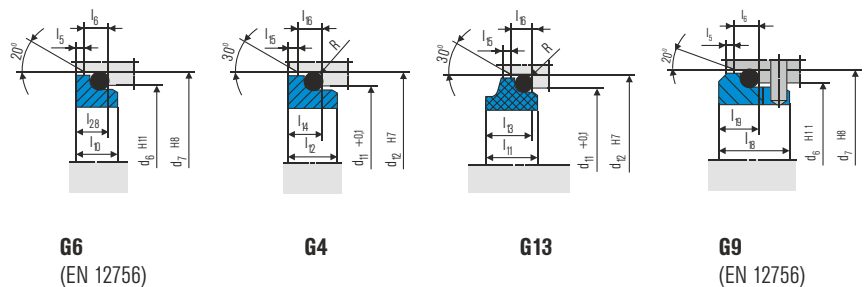
### Standards

EN 12756

Item	Part no.	Description
1.1	472	Seal face
1.2	412.1	O-Ring
1.3	474	Thrust ring
1.4	478	Righthand spring
1.4	479	Lefthand spring
2	475	Seat (G9)
3	412.2	O-Ring

**DIN 24250**

### Stationary Seats



**G6**  
(EN 12756)

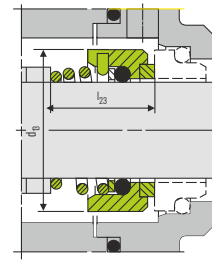
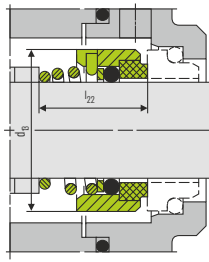
**G4**

**G13**

**G9**  
(EN 12756)

# DIE DICHTUNGS - COMPANY

## Design Variations



### DAA

Items and description as DAA-13.  
 Seal face: Special cast CrMo steel (S)  
 Seat G13: Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B)

### DCA

Items and descriptions as for type DAA-13, but with carbon graphite seal face shrink-fitted to the seal face carrier (Item no. 1.1).  
 Seal face: Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B)  
 Seat G4: special cast CrMo steel (S), Silicon carbide (Q1, Q2)  
 Seat G6 (DCA-13E): Special cast CrMo steel (S), Silicon carbide (Q1, Q2)  
 Seat G9 (DCA-13): Silicon carbide (Q1, Q2)  
 Seat G6 also available in A, B = G30 (longer installation length than G6)

### DHA6

Items and descriptions as for type DAA-13, but with shrink fitted silicon carbide seal face to the seal face carrier (Item no. 1.1).  
 Shaft diameter: d1 = Upto 80 mm (Upto ... 3.125")  
 Temperature: t = -20 °C ... +180 °C (-4 °F ... +355 °F)  
 Sliding velocity: v<sub>g</sub> = 10 m/s (33 ft/s)  
 Seal face: Silicon carbide (Q12, Q22), Tungsten carbide (U22)  
 Seat G4: Silicon carbide (Q1, Q2)  
 Seat G13: Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B)  
 Seat G6 (DHA6-13-E): Silicon carbide (Q1, Q2)  
 Seat G9 (DHA6-13): Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B), Silicon carbide (Q1, Q2)  
 Seat G6 also available in A, B = G30 (longer installation length than G6)

## Dimensional Data

Dimensions in millimeter

d <sub>1</sub>	d <sub>3</sub>	d <sub>6</sub>	d <sub>7</sub>	d <sub>8</sub>	d <sub>11</sub> <sup>(1)</sup>	d <sub>12</sub> <sup>(1)</sup>	d <sub>13</sub>	d <sub>b</sub>	l <sub>1N</sub>	l <sub>3</sub> <sup>(3)</sup>	l <sub>5</sub>	l <sub>6</sub>	l <sub>7</sub>	l <sub>8</sub>	l <sub>9</sub>	l <sub>10</sub>	l <sub>11</sub>	l <sub>12</sub>	l <sub>13</sub>	l <sub>14</sub>	l <sub>15</sub>	l <sub>16</sub>	l <sub>18</sub>	l <sub>19</sub>	l <sub>21</sub> <sup>(3)</sup>	l <sub>22</sub>	l <sub>23</sub>	l <sub>28</sub>	b <sup>(2)</sup>	R
6	14	-	-	-	11.5	16.0	16	8	-	-	-	-	-	-	-	-	9.0	6.5	7.1	5.6	1.2	3.8	-	-	10.5	11.9	-	-	-	1.2
8	18	-	-	-	15.5	19.2	18	11	-	-	-	-	-	-	-	-	9.0	8.0	7.1	7.0	1.2	3.8	-	-	15.5	16.9	-	-	-	1.2
10	19	17	21	3	15.5	19.2	20	13	40	15.5	1.5	4	8.5	17.5	10.0	7.5	9.0	7.5	7.1	6.6	1.2	3.8	-	-	15.5	16.9	-	6.6	8	1.2
12	21	19	23	3	17.5	21.6	22	16	40	16.0	1.5	4	8.5	17.5	10.0	7.5	10.0	6.5	7.6	5.6	1.2	3.8	-	-	15.5	17.4	-	6.6	8	1.2
14	23	21	25	3	20.5	24.6	24	18	40	16.5	1.5	4	8.5	17.5	10.0	7.5	10.0	6.5	7.6	5.6	1.2	3.8	-	-	15.5	17.4	16.5	6.6	8	1.2
15	24	-	-	-	20.5	24.6	25	19	-	-	-	-	-	-	-	-	11.0	7.5	8.6	6.6	1.2	3.8	-	-	15.5	17.4	-	-	-	1.2
16	26	23	27	3	22.0	28.0	26	21	40	18.0	1.5	4	8.5	17.5	10.0	7.5	11.5	8.5	9.0	7.5	1.5	5.0	-	-	17.5	19.5	16.5	6.6	8	1.5
18	29	27	33	3	24.0	30.0	31	23	45	19.5	2.0	5	9.0	19.5	11.5	8.5	12.5	9.0	10.0	8.0	1.5	5.0	15	7	18.5	20.5	18.0	7.5	8	1.5
20	31	29	35	3	29.5	35.0	34	26	45	22.0	2.0	5	9.0	19.5	11.5	8.5	12.5	8.5	9.5	7.5	1.5	5.0	15	7	20.0	22.0	19.0	7.5	8	1.5
22	33	31	37	3	29.5	35.0	36	28	45	21.5	2.0	5	9.0	19.5	11.5	8.5	12.5	8.5	9.5	7.5	1.5	5.0	15	7	21.5	23.5	20.5	7.5	8	1.5
24	35	33	39	3	32.0	38.0	38	30	50	23.5	2.0	5	9.0	19.5	11.5	8.5	12.5	8.5	9.5	7.5	1.5	5.0	15	7	23.0	25.0	22.0	7.5	8	1.5
25	36	34	40	3	32.0	38.0	39	31	50	26.5	2.0	5	9.0	19.5	11.5	8.5	12.5	8.5	9.5	7.5	1.5	5.0	15	7	24.5	26.5	23.5	7.5	8	1.5
26	37	-	-	-	34.0	40.0	40	32	-	-	-	-	9.0	-	-	-	13.0	9.0	10.0	8.0	1.5	5.0	-	-	24.5	26.5	23.5	-	-	1.5
28	40	37	43	3	36.0	42.0	42	35	50	26.5	2.0	5	9.0	19.5	11.5	8.5	14.0	10.0	11.0	9.0	1.5	5.0	15	7	24.5	26.5	24.5	7.5	8	1.5
30	43	39	45	3	39.2	45.0	44	37	50	26.5	2.0	5	9.0	19.5	11.5	8.5	14.0	11.5	11.0	10.5	1.5	5.0	15	7	24.5	25.0	24.5	7.5	8	1.5
32	46	42	48	3	42.2	48.0	46	39	55	28.5	2.0	5	9.0	19.5	11.5	8.5	14.0	11.5	11.0	10.5	1.5	5.0	15	7	28.0	28.5	28.0	7.5	8	1.5
33	47	42	48	3	-	-	47	40	55	28.5	2.0	5	9.0	19.5	11.5	8.5	-	12.0	-	-	-	-	15	7	-	-	-	7.5	8	1.5
35	49	44	50	3	46.2	52.0	49	43	55	28.5	2.0	5	9.0	19.5	11.5	8.5	14.5	12.0	11.5	11.0	1.5	5.0	15	7	28.0	28.5	28.0	7.5	8	1.5
38	53	49	56	4	49.2	55.0	54	45	55	33.5	2.0	6	9.0	22.0	14.0	10.0	14.5	11.3	11.5	10.3	1.5	5.0	16	8	31.0	32.2	31.0	9.0	7.5	1.5
40	56	51	58	4	52.2	58.0	56	49	55	36.0	2.0	6	9.0	22.0	14.0	10.0	14.5	11.8	11.5	10.8	1.5	5.0	16	8	34.0	34.7	34.0	9.0	8	1.5
42	59	-	-	-	53.3	62.0	58	52	-	-	-	-	9.0	-	-	-	17.0	13.2	14.3	12.0	2.0	6.0	-	-	35.0	37.3	35.0	-	-	2.5
43	59	54	61	4	-	-	59	52	60	38.5	2.0	6	9.0	22.0	14.0	10.0	-	13.2	-	-	2.0	-	16	8	-	-	-	9.0	7.5	2.5
45	61	56	63	4	55.3	64.0	61	55	60	39.5	2.0	6	9.0	22.0	14.0	10.0	17.0	12.8	14.3	11.6	2.0	6.0	16	8	36.5	39.2	36.5	9.0	8	2.5
48	64	59	66	4	59.7	68.4	64	58	60	46.0	2.0	6	9.0	22.0	14.0	10.0	17.0	12.8	14.3	11.6	2.0	6.0	16	8	42.0	44.7	42.0	9.0	8	2.5
50	66	62	70	4	60.8	69.3	66	61	60	45.0	2.5	6	9.0	23.0	15.0	10.5	17.0	12.8	14.3	11.6	2.0	6.0	17	9.5	43.0	45.7	43.0	9.5	8	2.5
53	69	65	73	4	-	-	69	64	70	47.0	2.5	6	9.0	23.0	15.0	12.0	-	13.5	-	-	-	-	17	9.5	-	-	-	11.0	8	2.5
55	71	67	75	4	66.5	75.4	71	66	70	49.0	2.5	6	9.0	23.0	15.0	12.0	18.0	14.5	15.3	13.3	2.0	6.0	17	9.5	47.0	49.0	47.0	11.0	8	2.5
58	76	70	78	4	69.5	78.4	78	69	70	55.0	2.5	6	9.0	23.0	15.0	12.0	18.0	14.5	15.3	13.3	2.0	6.0	18	10.5	50.0	52.0	50.0	11.0	8	2.5
60	78	72	80	4	71.5	80.4	79	71	70	55.0	2.5	6	9.0	23.0	15.0	12.0	18.0	14.5	15.3	13.3	2.0	6.0	18	10.5	51.0	55.0	51.0	11.0	8	2.5
63	83	75	83	4	-	-	83	74	70	55.0	2.5	6	9.0	23.0	15.0	12.0	-	14.2	-	-	-	-	18	10.5	-	-	-	11.0	8	2.5
65	84	77	85	4	76.5	85.4	85	77	80	55.0	2.5	6	9.0	23.0	15.0	12.0	18.0	14.2	15.3	13.0	2.0	6.0	18	10.5	52.0	54.3	52.0	11.0	8	2.5
68	88	81	90	4	82.7	91.5	88	80	80	55.0	2.5	7	9.0	26.0	18.0	12.5	19.0	14.9	16.0	13.7	2.0	6.0	18.5	11.0	53.0	55.3	52.7	11.3	8	2.5
70	90	83	92	4	83.0	92.0	90	83	80	57.0	2.5	7	9.0	26.0	18.0	12.5	18.0	14.2	15.3	13.0	2.0	6.0	19	11.5	54.0	56.3	54.0	11.3	10	2.5
75	98	88	97	4	90.2	99.0	98	88	80	62.0	2.5	7	9.0	26.0	18.0	12.5	18.0	15.2	15.3	14.0	2.0	6.0	19	11.5	55.0	56.3	54.0	11.3	10	2.5
80	100	95	105	4	95.2	104.0	103	93	90	61.8	3.0	7	9.0	26.2	18.2	13.0	19.0	16.2	16.3	15.0	2.0	6.0	19	11.5	58.0	59.3	58.0	12.0	10	2.5

According to EN 12756

inch size also available from size 0.375 to 3.125

Note: Additional technical & dimensional information will be provided on request.



### Product Description

1. Crest to Crest Wave spring or multiple springs rotating
2. For plain shafts
3. Independent of direction of rotation
4. Single seal
5. Unbalanced
6. Variant with FEP & Spring energised PTFE seals.

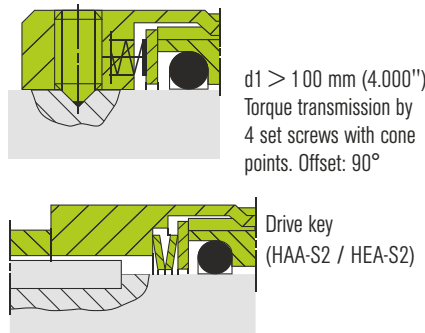
### Technical Features

1. Flexibility in torque transmissions
2. Pumping screw for media with higher viscosity also possible
3. Self cleaning effect
4. Short installation length also possible
5. Suitable for media with low solids contents
6. Versatile application possibilities

### Performance Capabilities

Sizes:  $d_1$  = Upto 100 mm (Upto 4.000")  
 Pressure:  $p_1$  = 25 bar (363 PSI)  
 Temperature:  $t$  = -50 °C ... +220 °C (-58 °F ... +428 °F)  
 Speed = 20 m/s (66 ft/s)  
 Permissible axial movement:  
 $d_1$  = up to 25 mm:  $\pm 1.0$  mm  
 $d_1$  = 28 up to 63 mm:  $\pm 1.5$  mm  
 $d_1$  = from 65 mm:  $\pm 2.0$  mm

### Torque Transmissions



$d_1 > 100$  mm (4.000")  
 Torque transmission by 4 set screws with cone points. Offset: 90°

Drive key  
 (HAA-S2 / HEA-S2)

### Standards

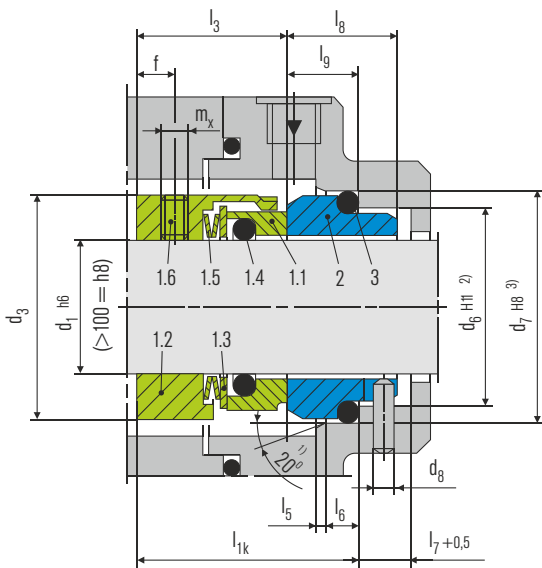
EN 12756

### Materials

Seal face: Special cast CrMo steel (S), Silicon carbide (Q1, Q2), Aluminium oxide (V)  
 Seat G9: Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B), Silicon carbide (Q1\*, Q2\*)  
 Seat G6: Silicon carbide (Q1\*, Q2\*)  
 Seat G13: Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B)  
 Secondary seals: EPDM (E), NBR (P), FKM (V), FFKM (K)  
 Springs: CrNiMo steel (G) Metal parts: CrNiMo steel (G), Duplex (G1)  
 \* Cannot be combined with seal face made of S

Item	Part no.	Description
1.1	472	Seal face
1.2	485	Drive collar
1.3	474	Thrust ring
1.4	412.1	O-Ring
1.5	477	Spring
1.6	904	Set screw
2	475	Seat (G9)
3	412.2	O-Ring
<b>DIN 24250</b>		

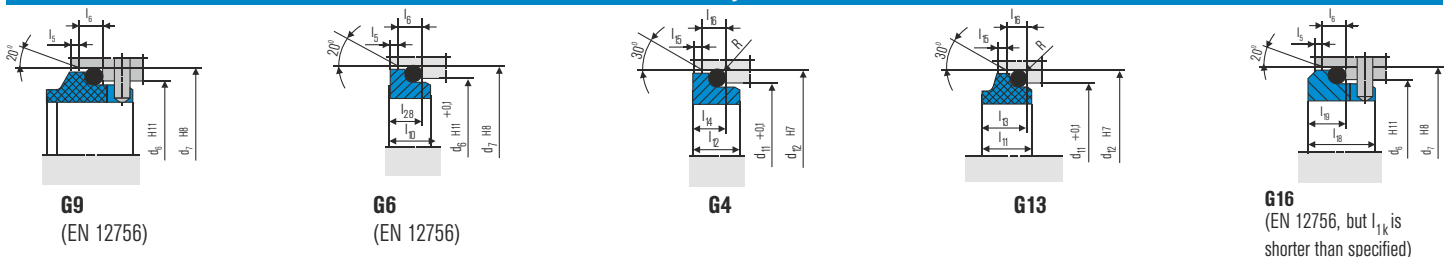
- |                         |
|-------------------------|
| 1) $d_1 > 100$ mm: 30°  |
| 2) $d_1 > 100$ mm: +0.1 |



### Typical Industrial Applications

- Chemical industry
- Food and beverage industry
- Medias with low solid contents
- Marine applications
- Process industry
- Water and waste water technology
- Chemical standard pumps
- Gear wheel feed pumps
- Multistage pumps
- Vertical screw pumps

### Stationary Seats



**G9**  
 (EN 12756)

**G6**  
 (EN 12756)

**G4**

**G13**

**G16**  
 (EN 12756, but  $l_{1k}$  is shorter than specified)



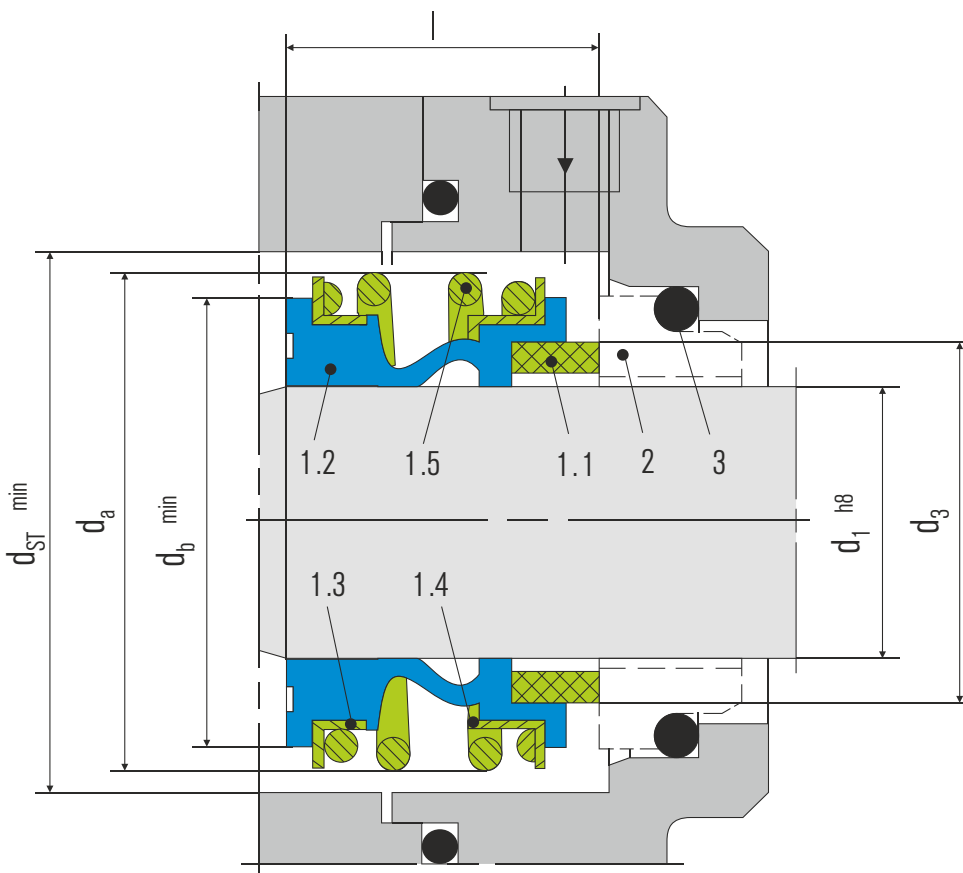


### Product Description

1. Elastomer bellows rotating
2. For plain shafts
3. Independent of direction of rotation
4. Unbalanced

### Technical Features

1. Economical seal solution
2. Suitable for mild sterile applications
3. Universal application possibilities



### Typical Industrial Applications

Chemical industry  
 Food processing industry  
 Pulp, paper & Latex  
 Water, waste water and mild slurries  
 Chemical standard pumps  
 Helical screw pumps  
 Submersible pumps

### Performance Capabilities

Sizes: d1 Upto 100 mm (Upto 4.000")  
 Pressure: p1\* = 16 bar (230 PSI)  
 Temperature: t = -20 °C ... +140 °C (-4 °F... +284 °F)  
 Speed: = 10 m/s (33 ft/s)  
 Permissible axial movement: ±2.0 mm

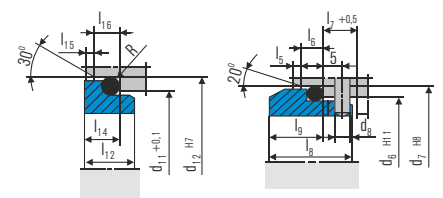
### Notes

The 6BAA can also be used as a multiple seal in tandem or in a back-to-back arrangement. Installation proposals can be supplied on request.  
 Dimension adaptations for specific conditions, e.g. shaft in inches or special seat dimensions are available on request.

### Standards

EN 12756

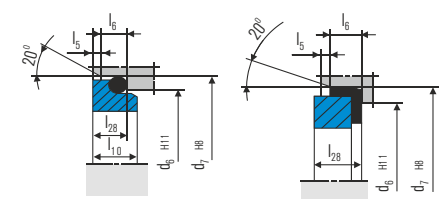
### Stationary Seats



G4

G9

EN 12756



G6

EN 12756

G60

EN 12756

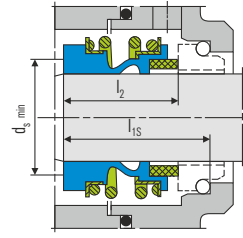
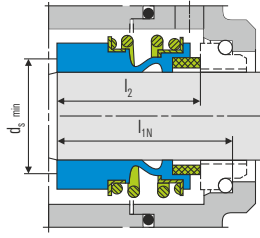
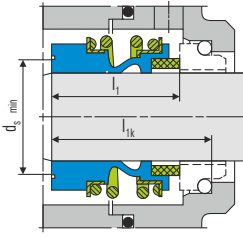
### Materials

Seal face: Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B), Silicon carbide (Q1), Tungsten carbide (U3)  
 Seat: Silicon carbide (Q1, Q2), Tungsten carbide (U3), Special cast CrMo steel (S), Aluminium oxide (V)  
 Elastomer: NBR (P), EPDM (E), FKM (V), Metal parts: CrNiMo steel (G), Hastelloy® C-4 (M)

Item	Part no.	Description
1.1	472	Seal face
1.2	481	Bellows
1.3	484.2	L-ring (spring collar)
1.4	484.1	L-ring (spring collar)
1.5	477	Spring
2	475	Seat
3	412	O-Ring or cup rubber

**DIN 24250**

## Design Variations



### 6BCA

Dimensions, items and designations same as for 6BAA, but with an extended bellows tail to achieve the fitting length  $l_{1k}$  according to EN 12756 in combination with seat G6 or G60 ( $d_6$  exceeds EN 12756).

### 6BDA

Dimensions, items and designations same as for 6BAA, but with an extended bellows tail to achieve the fitting length  $l_{1N}$  according to EN 12756 in combination with seat G6 or G60 ( $d_6$  exceeds EN 12756).

### 6BAA-S20

Dimensions, items and designations same as for 6BAA, but with an extended bellows tail to achieve the special fitting length  $l_{1S}$  in combination with seat G50.

## Dimensional Data

### Dimensions in millimeter

$d_1$	$d_3$	$d_6$	$d_7$	$d_8$	$d_{11}$	$d_{12}$	$d_{14}$	$d_{16}$	$d_a$	$d_b^{*)}$	$d_m^{*)}$	$d_s^{*)}$	$d_{ST}$	$l$	$l_1$	$l_{1k}$	$l_{1N}$	$l_{1S}$	$l_2$	$l_3$	$l_5$	$l_6$	$l_7$	$l_8$	$l_9$	$l_{10}$	$l_{12}$	$l_{14}$	$l_{15}$	$l_{16}$	$l_{17}$	$l_{28}$	$l_{29}$	R
10	15.7	17	21	3	15.5	19.2	11.0	24.60	22.5	20.5	18	18	24	14.5	25.9	32.5	40	34.0	33.4	25	1.5	4	8.5	17.5	10.0	7.5	7.5	6.6	1.2	3.8	7.5	6.6	9.0	1.2
12	17.7	19	23	3	17.5	21.6	13.5	27.80	25.0	22.5	20	20	26	15.0	25.9	32.5	40	34.0	33.4	25	1.5	4	8.5	17.5	10.0	7.5	6.5	5.6	1.2	3.8	7.5	6.6	9.0	1.2
14	19.7	21	25	3	20.5	24.6	17.0	30.95	28.5	26.5	22	22	30	17.0	28.4	35.0	40	35.5	33.4	25	1.5	4	8.5	17.5	10.0	7.5	6.5	5.6	1.2	3.8	9.0	6.6	10.5	1.2
15	20.8	-	-	-	20.5	24.6	17.0	30.95	28.5	26.5	22	22	30	17.0	28.4	-	-	35.5	33.4	25	-	-	-	-	-	7.5	6.6	1.2	3.8	9.0	-	10.5	1.2	
16	21.0	23	27	3	22.0	28.0	17.0	30.95	28.5	26.5	22	22	30	17.0	28.4	35.0	40	35.5	33.4	25	1.5	4	8.5	17.5	10.0	7.5	8.5	7.5	1.5	5.0	9.0	6.6	10.5	1.5
18	23.7	27	33	3	24.0	30.0	20.0	34.15	32.0	29.0	29	26	33	19.5	30.0	37.5	45	35.5	37.5	25	2.0	5	9.0	19.5	11.5	8.5	9.0	8.0	1.5	5.0	9.0	7.5	10.5	1.5
19	26.7	-	-	-	-	-	20.0	34.15	37.0	33.0	33	28	38	21.5	30.0	-	-	35.5	37.5	25	-	-	-	-	-	-	-	-	-	-	9.0	-	10.5	-
20	26.7	29	35	3	29.5	35.0	21.5	35.70	37.0	33.0	33	28	38	21.5	30.0	37.5	45	35.5	37.5	25	2.0	5	9.0	19.5	11.5	8.5	8.5	7.5	1.5	5.0	9.0	7.5	10.5	1.5
22	27.7	31	37	3	29.5	35.0	23.0	37.30	37.0	33.0	33	28	38	21.5	30.0	37.5	45	35.5	37.5	25	2.0	5	9.0	19.5	11.5	8.5	8.5	7.5	1.5	5.0	9.0	7.5	10.5	1.5
24	31.2	33	39	3	32.0	38.0	26.5	40.50	42.5	38.0	38	32	44	22.5	32.5	40.0	50	35.5	42.5	25	2.0	5	9.0	19.5	11.5	8.5	8.5	7.5	1.5	5.0	9.0	7.5	10.5	1.5
25	31.2	34	40	3	32.0	38.0	26.5	40.50	42.5	38.0	38	32	44	23.0	32.5	40.0	50	35.5	42.5	25	2.0	5	9.0	19.5	11.5	8.5	8.5	7.5	1.5	5.0	9.0	7.5	10.5	1.5
28	35.0	37	43	3	36.0	42.0	29.5	47.65	49.0	44.0	37	37	50	26.5	35.0	42.5	50	45.0	42.5	33	2.0	5	9.0	19.5	11.5	8.5	10.0	9.0	1.5	5.0	10.5	7.5	12.0	1.5
30	37.0	39	45	3	39.2	45.0	32.5	50.80	49.0	44.0	37	37	50	26.5	35.0	42.5	50	45.0	42.5	33	2.0	5	9.0	19.5	11.5	8.5	11.5	10.5	1.5	5.0	10.5	7.5	12.0	1.5
32	40.2	42	48	3	42.2	48.0	32.5	50.80	53.5	46.0	41	41	55	27.5	35.0	42.5	55	45.0	47.5	33	2.0	5	9.0	19.5	11.5	8.5	11.5	10.5	1.5	5.0	10.5	7.5	12.0	1.5
33	40.2	42	48	3	44.2	50.0	36.5	54.00	53.5	46.0	41	41	55	27.5	35.0	42.5	55	45.0	47.5	33	2.0	5	9.0	19.5	11.5	8.5	12.0	11.0	1.5	5.0	10.5	7.5	12.0	1.5
35	43.2	44	50	3	46.2	52.0	36.5	54.00	57.0	50.0	44	44	59	28.5	35.0	42.5	55	45.0	47.5	33	2.0	5	9.0	19.5	11.5	8.5	12.0	11.0	1.5	5.0	10.5	7.5	12.0	1.5
38	46.2	49	56	4	49.2	55.0	39.5	57.15	59.0	53.0	53	47	61	30.0	36.0	45.0	55	45.0	46.0	33	2.0	6	9.0	22.0	14.0	10.0	11.3	10.3	1.5	5.0	10.5	9.0	12.0	1.5
40	48.8	51	58	4	52.2	58.0	42.5	60.35	62.0	55.0	55	49	64	30.0	36.0	45.0	55	45.0	46.0	33	2.0	6	9.0	22.0	14.0	10.0	11.8	10.8	1.5	5.0	10.5	9.0	12.0	1.5
42	51.8	-	-	-	53.3	62.0	46.0	63.50	65.5	58.0	53	53	67	30.0	36.0	-	-	53.0	51.0	41	-	-	-	-	-	13.2	12.0	2.0	6.0	10.5	-	12.0	2.5	
43	51.8	54	61	4	53.3	62.0	46.0	63.50	65.5	58.0	53	53	67	30.0	36.0	45.0	60	53.0	51.0	41	2.0	6	9.0	22.0	14.0	10.0	13.2	12.0	2.0	6.0	10.5	9.0	12.0	2.5
45	53.8	56	63	4	55.3	64.0	46.0	63.50	68.0	60.0	55	55	70	30.0	36.0	45.0	60	53.0	51.0	41	2.0	6	9.0	22.0	14.0	10.0	12.8	11.6	2.0	6.0	10.5	9.0	12.0	2.5
48	56.8	59	66	4	59.7	68.4	49.0	66.70	70.5	63.0	58	58	74	30.5	36.0	45.0	60	53.0	51.0	41	2.0	6	9.0	22.0	14.0	10.0	12.8	11.6	2.0	6.0	10.5	9.0	12.0	2.5
50	58.8	62	70	4	60.8	69.3	52.0	69.85	74.0	65.0	60	60	77	30.5	38.0	47.5	60	54.5	50.5	41	2.5	6	9.0	23.0	15.0	10.5	12.8	11.6	2.0	6.0	12.0	9.5	13.5	2.5
53	62.2	65	73	4	63.8	72.3	55.5	73.05	78.5	70.0	63	63	81	33.0	36.5	47.5	70	54.5	59.0	41	2.5	6	9.0	23.0	15.0	12.0	13.5	12.3	2.0	6.0	12.0	11.0	13.5	2.5
55	64.2	67	75	4	66.5	75.4	58.5	76.20	81.0	72.0	65	65	83	35.0	36.5	47.5	70	54.5	59.0	41	2.5	6	9.0	23.0	15.0	12.0	14.5	13.3	2.0	6.0	12.0	11.0	13.5	2.5
58	67.2	70	78	4	69.5	78.4	61.5	79.40	85.5	75.0	68	68	88	37.0	41.5	52.5	70	54.5	59.0	41	2.5	6	9.0	23.0	15.0	12.0	14.5	13.3	2.0	6.0	12.0	11.0	13.5	2.5
60	70.0	72	80	4	71.5	80.4	61.5	79.40	88.5	79.0	70	70	91	38.0	41.5	52.5	70	54.5	59.0	41	2.5	6	9.0	23.0	15.0	12.0	14.5	13.3	2.0	6.0	12.0	11.0	13.5	2.5
65	75.0	77	85	4	76.5	85.4	68.0	92.10	93.5	84.0	77	77	96	40.0	41.5	52.5	80	65.0	69.0	49	2.5	6	9.0	23.0	15.0	12.0	14.2	13.0	2.0	6.0	14.5	11.0	16.0	2.5
68	78.0	81	90	4	82.7	91.5	71.0	95.25	96.5	88.0	80	80	100	40.0	41.2	52.5	80	65.0	68.7	49	2.5	7	9.0	26.0	18.0	12.5	14.9	13.7	2.0	6.0	14.5	11.3	16.0	2.5
70	80.0	83	92	4	83.0	92.0	71.0	95.25	99.5	90.0	82	82	103	40.0	48.7	60.0	80	65.0	68.7	49	2.5	7	9.0	26.0	18.0	12.5	14.2	13.0	2.0	6.0	14.5	11.3	16.0	2.5
75	85.5	88	97	4	90.2	99.0	77.5	101.60	107.0	95.0	87	87	110	40.0	48.7	60.0	80	68.0	68.7	52	2.5	7	9.0	26.0	18.0	12.5	15.2	14.0	2.0	6.0	14.5	11.3	16.0	2.5
80	90.5	95	105	4	95.2	104.0	84.0	114.30	112.0	100.0	92	92	116	40.0	48.0	60.0	90	76.0	78.0	56	3.0	7	9.0	26.2	18.2	13.0	16.2	15.0	2.0	6.0	18.5	12.0	20.0	2.5
85	96.0	100	110	4	100.2	109.0	87.0	117.50	120.0	107.0	97	97	124	41.0	46.0	60.0	90	76.0	76.0	56	3.0	7	9.0	26.2	18.2	15.0	16.0	14.8	2.0	6.0	18.5	14.0	20.0	2.5
90	102.0	105	115	4	105.2	114.0	93.5	123.85	127.0	114.0	104	104	131	45.0	51.0	65.0	90	79.0	76.0	59	3.0	7	9.0	26.2	18.2	15.0	16.0	14.8	2.0	6.0	18.5	14.0	20.0	2.5
95	107.0	110	120	4	111.6	120.3	96.5	127.00	132.0	119.0	109	109	136	46.0	51.0	65.0	90	79.0	76.0	59	3.0	7	9.0	25.2	17.2	15.0	17.0	15.8	2.0	6.0	18.5	14.0	20.0	2.5
100	112.0	115	125	4	114.5	123.3	103.0	133.35	137.0	124.0	114	114	140	47.0	51.0	65.0	90	82.0	76.0	62	3.0	7	9.0	25.2	17.2	15.0	17.0	15.8	2.0	6.0	18.5	14.0	20.0	2.5

inch size available from size 0.375 to 4.000

Note: Additional technical & dimensional information will be provided on request.

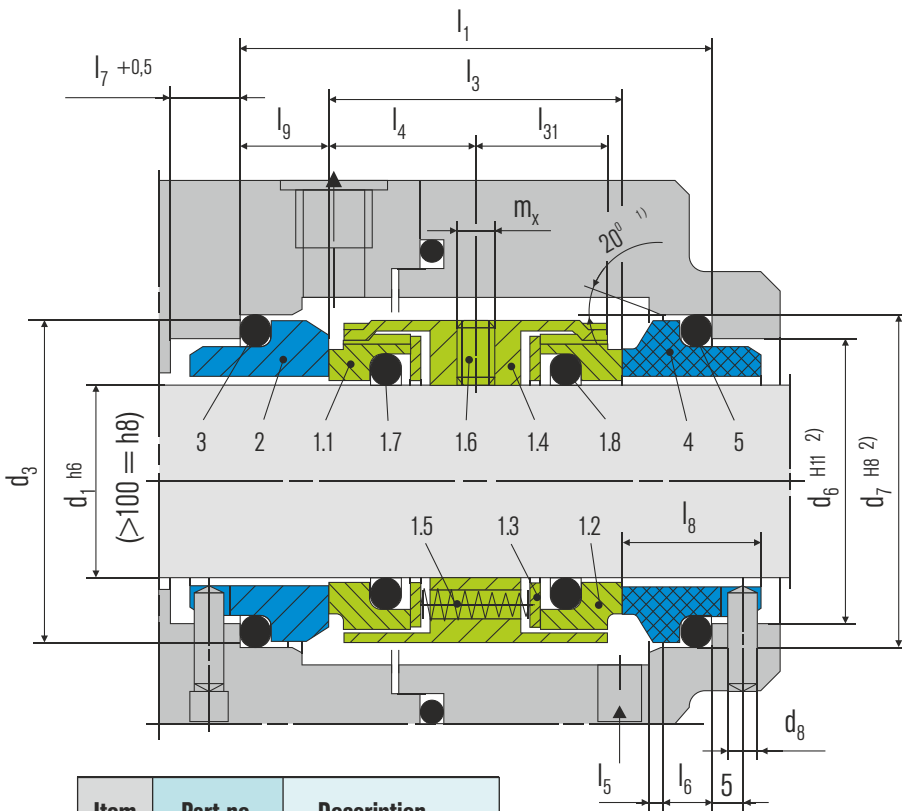


### Product Description

1. Dual seal
2. For plain shafts
3. Independent of direction of rotation
4. Rotating multiple springs
5. Seal concept based on the HAA range
6. Unbalanced
7. Variant with pumping screw available (HEA5-3)

### Technical Features

1. Flexibility in torque transmissions
2. Pumping screw for media with higher viscosity also possible
3. Self cleaning effect
4. Short installation length also possible
5. Suitable for media with low solids contents
6. Versatile application possibilities
7. EN 12756 (For connection dimensions d1 upto 100 mm)



Item	Part no.	Description
1.1	472.1	Seal face
1.2	472.2	Seal face
1.3	474	Thrust ring
1.4	485	Drive collar
1.5	477	Spring
1.6	904	Set screw
1.7	412.1	O-Ring
1.8	412.2	O-Ring
2	475.1	Seat (G9)
3	412.3	O-Ring
4	475.2	Seat (G9)
5	412.4	O-Ring

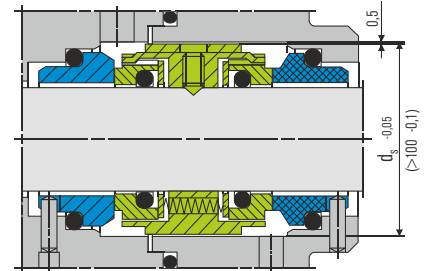
**DIN 24250**

- 1) d1 > 100 mm: 30°
- 2) d1 > 100 mm: +0.1

### Typical Industrial Applications

- Adhesives
- Chemical industry
- Low solids content and low abrasive media
- Media with poor lubrication properties
- Process industry
- Toxic and hazardous media
- Chemical standard pumps

### Design Variations



### HEA5-3

Dimensions, items and descriptions as for HEA-3, but with pumping screw (Item no. 1.4).  
 Dependent on direction of rotation. Viscosity ≤ ISO VG10.

### Performance Capabilities

Sizes: d1 = Upto 200 mm (Upto 7.875")  
 Pressure: p1 = 25 bar (363 PSI)  
 Temperature: t = -50 °C ... 220 °C (-58 °F ... 428 °F)  
 Speed = 20 m/s (66 ft/s)  
 Permissible axial movement:  
 d1 from 100 mm: ± 2.0 mm

### Materials

Seal face: Special cast CrMo steel (S), Silicon carbide (Q1, Q2)  
 Seat G9: Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B), Silicon carbide (Q1\*, Q2\*)  
 Seat G4: Silicon carbide (Q1\*, Q2\*)  
 Seat G6: Silicon carbide (Q1\*, Q2\*)  
 Seat G13: Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B)  
 \* Cannot be combined with seal face made of S

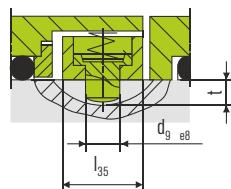
### Standards

EN 12756

### Torque Transmissions



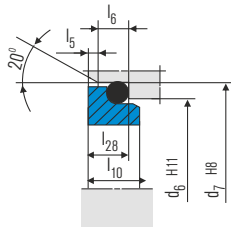
d1 > 100 mm (4.000")  
 Torque transmission by 4 set screws with cone point. Offset: 90°



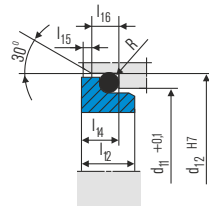
Spring loaded drive pin (HEA-3-W)



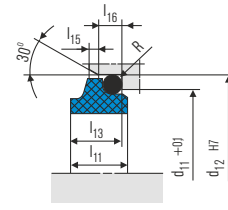
## Stationary Seats



**G6**  
(EN 12756)



**G4**



**G13**

## Dimensional Data

Dimensions in millimeter

d <sub>1</sub>	d <sub>3</sub>	d <sub>6</sub>	d <sub>7</sub>	d <sub>8</sub>	d <sub>9</sub>	d <sub>11</sub>	d <sub>12</sub>	d <sub>s</sub>	l <sub>1</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>5</sub>	l <sub>6</sub>	l <sub>7</sub>	l <sub>8</sub>	l <sub>9</sub>	l <sub>10</sub>	l <sub>11</sub>	l <sub>12</sub>	l <sub>13</sub>	l <sub>14</sub>	l <sub>15</sub>	l <sub>16</sub>	l <sub>28</sub>	l <sub>31</sub>	l <sub>35</sub>	m <sub>x</sub>	t	R	
18	33	27.0	33.0	3	4	24.0	30.0	-	61.0	38	19.0	2.0	5	9	19.5	11.5	8.5	12.5	9.0	10.0	8.0	1.5	5	7.5	17.0	15	M5	3.5	1.5	
20	35	29.0	35.0	3	4	29.5	35.0	-	61.0	38	19.0	2.0	5	9	19.5	11.5	8.5	12.5	8.5	9.5	7.5	1.5	5	7.5	17.0	15	M5	3.5	1.5	
22	37	33.0	37.0	3	4	29.5	35.0	42	61.0	38	19.0	2.0	5	9	19.5	11.5	8.5	12.5	8.5	9.5	7.5	1.5	5	7.5	17.0	15	M5	3.5	1.5	
24	39	33.0	39.0	3	4	32.0	38.0	44	61.0	38	19.0	2.0	5	9	19.5	11.5	8.5	12.5	8.5	9.5	7.5	1.5	5	7.5	17.0	15	M5	3.5	1.5	
25	40	34.0	40.0	3	4	32.0	38.0	45	61.0	38	19.0	2.0	5	9	19.5	11.5	8.5	12.5	8.5	9.5	7.5	1.5	5	7.5	17.0	15	M5	3.5	1.5	
28	43	37.0	43.0	3	4	36.0	42.0	47	62.0	39	19.5	2.0	5	9	19.5	11.5	8.5	14.0	10.0	11.0	9.0	1.5	5	7.5	17.5	15	M6	3.5	1.5	
30	45	39.0	45.0	3	4	39.2	45.0	49	62.0	39	19.5	2.0	5	9	19.5	11.5	8.5	14.0	11.5	11.0	10.5	1.5	5	7.5	17.5	15	M6	3.5	1.5	
32	47	42.0	48.0	3	4	42.2	48.0	51	62.0	39	19.5	2.0	5	9	19.5	11.5	8.5	14.0	11.5	11.0	10.5	1.5	5	7.5	17.5	15	M6	3.5	1.5	
33	48	42.0	48.0	3	4	44.2	50.0	51	62.0	39	19.5	2.0	5	9	19.5	11.5	8.5	14.5	12.0	11.5	10.5	1.5	5	7.5	17.5	15	M6	3.5	1.5	
35	50	44.0	50.0	3	4	46.2	52.0	54	62.0	39	19.5	2.0	5	9	19.5	11.5	8.5	14.5	12.0	11.5	11.0	1.5	5	7.5	17.5	15	M6	3.5	1.5	
38	55	49.0	56.0	4	4	49.2	55.0	59	69.0	41	20.5	2.0	6	9	22.0	14.0	10.0	14.5	11.3	11.5	10.3	1.5	5	9.0	18.5	15	M6	3.5	1.5	
40	57	51.0	58.0	4	4	52.2	58.0	61	70.0	42	21.0	2.0	6	9	22.0	14.0	10.0	14.5	11.8	11.5	10.8	1.5	5	9.0	19.0	15	M6	3.5	1.5	
43	60	54.0	61.0	4	4	53.3	62.0	65	70.0	42	21.0	2.0	6	9	22.0	14.0	10.0	17.0	13.2	14.3	12.0	2.0	6	9.0	19.0	15	M6	3.5	2.5	
45	62	56.0	63.0	4	4	55.3	64.0	66	70.0	42	21.0	2.0	6	9	22.0	14.0	10.0	17.0	12.8	14.3	11.6	2.0	6	9.0	19.0	15	M6	3.5	2.5	
48	65	59.0	66.0	4	4	59.7	68.4	69	70.0	42	21.0	2.0	6	9	22.0	14.0	10.0	17.0	12.8	14.3	11.6	2.0	6	9.0	19.0	15	M6	3.5	2.5	
50	67	62.0	70.0	4	4	60.8	69.3	71	73.0	43	21.5	2.5	6	9	23.0	15.0	10.5	17.0	12.8	14.3	11.6	2.0	6	9.5	19.5	15	M6	3.5	2.5	
53	70	65.0	73.0	4	4	63.8	72.3	75	73.0	43	21.5	2.5	6	9	23.0	15.0	12.0	17.0	13.5	14.3	12.3	2.0	6	11.0	19.5	15	M6	3.5	2.5	
55	72	67.0	75.0	4	4	66.5	75.4	76	73.0	43	21.5	2.5	6	9	23.0	15.0	12.0	18.0	14.5	15.3	13.3	2.0	6	11.0	19.5	15	M8	3.5	2.5	
58	79	70.0	78.0	4	5	69.5	78.4	83	86.0	56	28.0	2.5	6	9	23.0	15.0	12.0	18.0	14.5	15.3	13.3	2.0	6	11.0	23.5	19	M8	3.5	2.5	
60	81	72.0	80.0	4	5	71.5	80.4	85	86.0	56	28.0	2.5	6	9	23.0	15.0	12.0	18.0	14.5	15.3	13.3	2.0	6	11.0	23.5	19	M8	3.5	2.5	
63	84	75.0	83.0	4	5	74.5	83.4	88	85.0	55	27.5	2.5	6	9	23.0	15.0	12.0	18.0	14.2	15.3	13.3	2.0	6	11.0	24.5	19	M8	3.5	2.5	
65	86	77.0	85.0	4	5	76.5	85.4	95	85.0	55	27.5	2.5	6	9	23.0	15.0	12.0	18.0	14.2	15.3	13.0	2.0	6	11.0	24.5	19	M8	3.5	2.5	
68	89	81.0	90.0	4	5	82.7	91.5	93	91.0	55	27.5	2.5	7	9	26.0	18.0	12.5	19.0	14.9	16.0	13.7	2.0	6	11.3	24.5	19	M8	3.5	2.5	
70	91	83.0	92.0	4	5	83.0	92.0	95	92.0	56	28.0	2.5	7	9	26.0	18.0	12.5	18.0	14.2	15.3	13.0	2.0	6	11.3	23.5	19	M8	3.5	2.5	
75	99	88.0	97.0	4	5	90.2	99.0	105	92.0	56	28.0	2.5	7	9	26.0	18.0	12.5	18.0	15.2	15.3	14.0	2.0	6	11.3	25.5	19	M8	3.5	2.5	
80	104	95.0	105.0	4	5	95.2	104.0	109	92.5	56	28.0	3.0	7	9	26.2	18.2	13.0	19.0	16.2	16.3	15.0	2.0	6	12.0	25.5	19	M8	3.5	2.5	
85	109	100.0	110.0	4	5	100.2	109.0	114	92.5	56	28.0	3.0	7	9	26.2	18.2	15.0	19.0	16.0	16.3	14.8	2.0	6	14.0	25.0	19	M8	3.5	2.5	
90	114	105.0	115.0	4	5	105.2	114.0	119	92.5	56	28.0	3.0	7	9	26.2	18.2	15.0	19.0	16.0	16.3	14.8	2.0	6	14.0	25.5	19	M8	3.5	2.5	
95	119	110.0	120.0	4	5	111.6	120.3	124	90.5	56	28.0	3.0	7	9	25.2	17.2	15.0	20.0	17.0	17.3	15.8	2.0	6	14.0	25.0	19	M8	3.5	2.5	
100	124	115.0	125.0	4	5	114.5	123.3	129	90.5	56	28.0	3.0	7	9	25.2	17.2	15.0	20.0	17.0	17.3	15.8	2.0	6	14.0	25.0	19	M8	3.5	2.5	
105	138	122.2	134.3	5	7	-	-	143	108.0	68	34.0	2.0	10	-	30.0	20.0	-	-	-	-	-	-	-	-	-	30.5	22	M8	3.5	-
110	143	128.2	140.3	5	7	-	-	148	110.0	70	35.0	2.0	10	-	30.0	20.0	-	-	-	-	-	-	-	-	-	31.5	22	M8	3.5	-
115	148	136.2	148.3	5	7	-	-	153	110.0	70	35.0	2.0	10	-	30.0	20.0	-	-	-	-	-	-	-	-	-	31.5	22	M8	3.5	-
120	153	138.2	150.3	5	7	-	-	158	110.0	70	35.0	2.0	10	-	30.0	20.0	-	-	-	-	-	-	-	-	-	31.5	22	M8	3.5	-
125	158	142.2	154.3	5	7	-	-	163	110.0	70	35.0	2.0	10	-	30.0	20.0	-	-	-	-	-	-	-	-	-	31.5	22	M8	3.5	-
130	163	146.2	158.3	5	7	-	-	168	110.0	70	35.0	2.0	10	-	30.0	20.0	-	-	-	-	-	-	-	-	-	31.5	22	M8	3.5	-
135	168	152.2	164.3	5	7	-	-	173	110.0	70	35.0	2.0	10	-	30.0	20.0	-	-	-	-	-	-	-	-	-	31.5	22	M8	3.5	-
140	173	156.2	168.3	5	7	-	-	178	110.0	70	35.0	2.0	10	-	30.0	20.0	-	-	-	-	-	-	-	-	-	31.5	22	M8	3.5	-
145	178	161.2	173.3	5	7	-	-	183	110.0	70	35.0	2.0	10	-	30.0	20.0	-	-	-	-	-	-	-	-	-	31.5	22	M8	3.5	-
150	183	168.2	180.3	5	7	-	-	188	114.0	70	35.0	2.0	10	-	32.0	22.0	-	-	-	-	-	-	-	-	-	31.5	22	M8	3.5	-
155	191	173.2	185.3	5	7	-	-	196	127.0	79	39.5	2.0	12	-	34.0	24.0	-	-	-	-	-	-	-	-	-	35.5	22	M8	3.5	-
160	196	178.2	190.3	5	7	-	-	201	127.0	79	39.5	2.0	12	-	34.0	24.0	-	-	-	-	-	-	-	-	-	35.5	22	M8	3.5	-
165	201	183.2	195.3	5	7	-	-	206	127.0	79	39.5	2.0	12	-	34.0	24.0	-	-	-	-	-	-	-	-	-	35.5	22	M8	3.5	-
170	206	188.2	200.3	5	7	-	-	211	127.0	79	39.5	2.0	12	-	34.0	24.0	-	-	-	-	-	-	-	-	-	35.5	22	M8	3.5	-
175	211	193.2	205.3	5	7	-	-	216	127.0	79	39.5	2.0	12	-	34.0	24.0	-	-	-	-	-	-	-	-	-	35.5	22	M8	3.5	-
180	216	207.5	219.3	5	7	-	-	221	135.0	79	39.5	2.0	12	-	38.0	28.0	-	-	-	-	-	-	-	-	-	35.5	22	M8	3.5	-
185	221	212.5	224.3	5	7	-	-	226	135.0	79	39.5	2.0	12	-	38.0	28.0	-	-	-	-	-	-	-	-	-	35.5	22	M8	3.5	-
190	226	217.5	229.3	5	7	-	-	231	135.0	79	39.5	2.0	12	-	38.0	28.0	-	-	-	-	-	-	-	-	-	35.5	22	M8	3.5	-
195	231	222.5	234.3	5	7	-	-	236	135.0	79	39.5	2.0	12	-	38.0	28.0	-	-	-	-</										

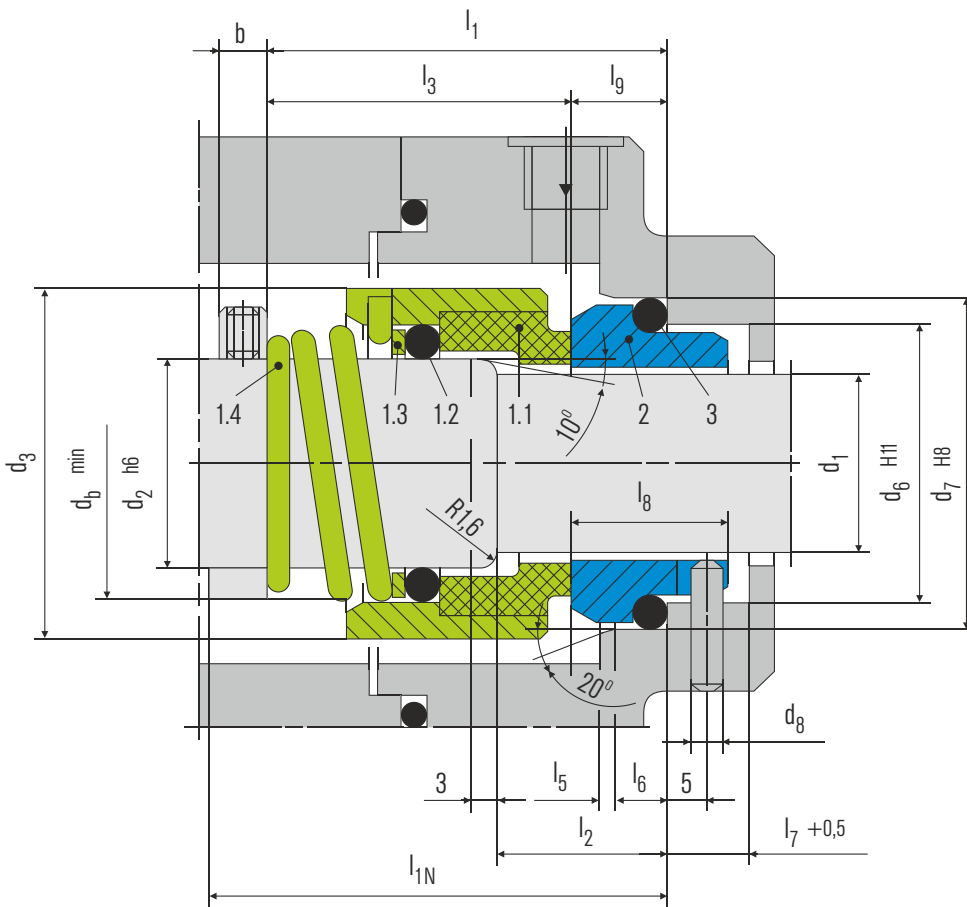


**Product Description**

1. Balanced
2. Dependent of direction of rotation
3. For stepped shafts
4. Single seal
5. Torque transmission via conical spring

**Technical Features**

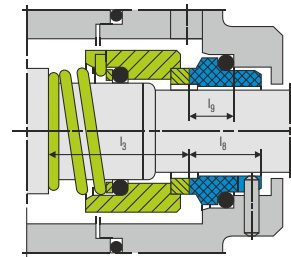
1. Economical seal solution
2. No damage of the shaft by set screws
3. Short installation length also possible



**Design Variations**

**BCA**

Dimensions, items and descriptions as for BCA-13, but with seat G16.  
 Seal face: Carbon graphite antimony impregnated (A)  
 Seat G16: Silicon carbide (Q1), CrMo cast steel (S), Aluminium oxide (V)



**BHA-6-13**

Dimensions, items and descriptions as for BCA-13, but with shrink-fitted seal face (Q12), item no. 1.1.  
 Temperature:  $t = -20^\circ\text{C} \dots +180^\circ\text{C} (-4^\circ\text{F} \dots +356^\circ\text{F})$   
 Seal face: Silicon carbide (Q12)  
 Seat G9: Silicon carbide (Q1, Q2), Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B)

**BHA-6**

Dimensions, items and descriptions as for BCA-13, but with shrink-fitted seal face (Q12) and seat G16.  
 Temperature:  $t = -20^\circ\text{C} \dots +180^\circ\text{C} (-4^\circ\text{F} \dots +356^\circ\text{F})$   
 Seal face: Silicon carbide (Q12)  
 Seat G16: Silicon carbide (Q1)

Item	Part no.	Description
1.1	472/473	Seal face
1.2	412.1	O-Ring
1.3	474	Thrust ring
1.4	478	Righthand spring
1.4	479	Lefthand spring
2	475	Seat (G9)
3	412.2	O-Ring

**DIN 24250**

**Typical Industrial Applications**

Chemical industry  
 Hot water  
 Medias with Low solids content  
 Water and waste water technology  
 Chemical standard pumps  
 Water and sewage pumps

**Performance Capabilities**

Sizes:  $d_1 = \text{Upto } 80 \text{ mm (Upto } 3.125\text{'')}$   
 Pressure:  $p_1 = 25 \text{ bar (363 PSI)}$   
 Temperature:  $t = -50^\circ\text{C} \dots +220^\circ\text{C} (-58^\circ\text{F} \dots +430^\circ\text{F})$   
 Speed =  $15 \text{ m/s (50 ft/s)}$   
 Permissible axial movement:  $\pm 1.0 \text{ mm}$

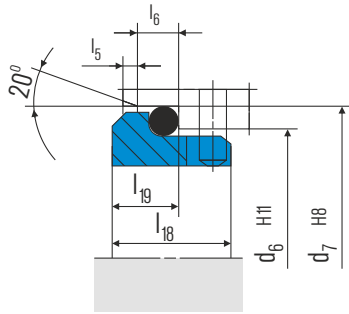
**Materials**

Seal face: Carbon graphite antimony impregnated (A)  
 Seat G9: Silicon carbide (Q1), Special cast CrMo steel (S)

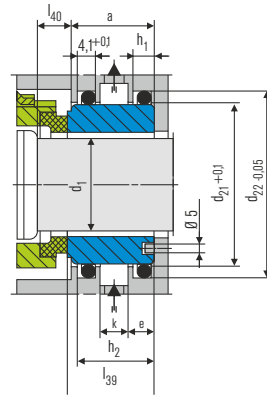
**Standards**

EN 12756

## Stationary Seats



**G16**  
(EN 12756 but  $l_{1k}$  and  $l_2$  are shorter than specified)



**6BBF**  
Cooled seat especially for hot water applications. In this case, the dimensions of the BCA-13 rotating unit are modified. Seal designation: BCH-6BBF.

## Dimensional Data

Dimensions in millimeter

$d_1$	$d_2$	$d_3$	$d_6$	$d_7$	$d_8$	$d_{21}$	$d_{22}$	$d_b$	$l_{1N}$	$l_1$	$l_2$	$l_3$	$l_5$	$l_6$	$l_7$	$l_8$	$l_9$	$l_{18}$	$l_{19}$	$l_{39}$	$l_{40}$	a	b	e	$h_1$	$h_2$	k	$b^*)$
10	14	24	17	21	3	-	-	18	50	35.5	18	25.5	1.5	4	8.5	17.5	10.0	-	-	-	-	-	5	-	-	-	-	8.0
12	16	26	19	23	3	-	-	21	50	36.5	18	26.5	1.5	4	8.5	17.5	10.0	-	-	-	-	-	5	-	-	-	-	8.0
14	18	31	21	25	3	-	-	23	55	39.5	18	29.5	1.5	4	8.5	17.5	10.0	-	-	-	-	-	6	-	-	-	-	8.0
16	20	34	23	27	3	-	-	26	55	41.0	18	31.0	1.5	4	8.5	17.5	10.0	-	-	-	-	-	6	-	-	-	-	8.0
18	22	36	27	33	3	-	-	28	55	44.0	20	32.5	2.0	5	9.0	19.5	11.5	15	7	-	-	-	6	-	-	-	-	8.0
20	24	38	29	35	3	-	-	30	60	44.0	20	32.5	2.0	5	9.0	19.5	11.5	15	7	-	-	-	6	-	-	-	-	8.0
22	26	40	31	37	3	-	-	31	60	44.0	20	32.5	2.0	5	9.0	19.5	11.5	15	7	-	-	-	6	-	-	-	-	8.0
24	28	42	33	39	3	-	-	35	60	44.0	20	32.5	2.0	5	9.0	19.5	11.5	15	7	-	-	-	6	-	-	-	-	8.0
25	30	44	34	40	3	-	-	37	60	45.0	20	33.5	2.0	5	9.0	19.5	11.5	15	7	-	-	-	6	-	-	-	-	8.0
28	33	47	37	43	3	44.65	50.57	40	65	47.0	20	35.5	2.0	5	9.0	19.5	11.5	15	7	24.0	8.5	24	6	8	6.6	22.6	9	8.0
30	35	49	39	45	3	47.83	53.75	43	65	47.0	20	35.5	2.0	5	9.0	19.5	11.5	15	7	24.5	9.0	24	6	8	6.6	22.6	9	8.0
32	38	54	42	48	3	47.83	53.75	45	65	51.0	20	39.5	2.0	5	9.0	19.5	11.5	15	7	24.5	9.0	24	6	8	6.6	22.6	9	7.5
33	38	54	42	48	3	47.83	53.75	45	65	51.0	20	39.5	2.0	5	9.0	19.5	11.5	15	7	24.5	9.0	24	6	8	6.6	22.6	9	7.5
35	40	56	44	50	3	51.00	56.92	49	65	55.0	20	43.5	2.0	5	9.0	19.5	11.5	15	7	24.5	9.0	24	6	8	6.6	22.6	9	8.0
38	43	59	49	56	4	54.18	60.10	52	75	60.0	23	46.0	2.0	6	9.0	22.0	14.0	16	8	26.0	11.0	24	6	8	6.6	22.6	9	7.5
40	45	61	51	58	4	60.53	66.45	55	75	62.0	23	48.0	2.0	6	9.0	22.0	14.0	16	8	26.0	11.0	24	6	8	6.6	22.6	9	8.0
43	48	64	54	61	4	63.70	69.62	58	75	65.0	23	51.0	2.0	6	9.0	22.0	14.0	16	8	26.0	11.0	24	6	8	6.6	22.6	9	8.0
45	50	66	56	63	4	63.70	69.62	61	75	69.0	23	55.0	2.0	6	9.0	22.0	14.0	16	8	26.0	11.0	24	6	8	6.6	22.6	9	8.0
48	53	69	59	66	4	66.88	72.80	64	85	69.0	23	55.0	2.0	6	9.0	22.0	14.0	16	8	26.0	11.0	24	8	8	6.6	22.6	9	8.0
50	55	71	62	70	4	70.05	75.97	66	85	73.0	25	58.0	2.5	6	9.0	23.0	15.0	17	9.5	26.5	12.5	24	8	8	6.6	22.6	9	8.0
53	58	78	65	73	4	76.40	82.32	69	85	75.0	25	60.0	2.5	6	9.0	23.0	15.0	17	9.5	26.5	12.5	24	8	8	6.6	22.6	9	8.0
55	60	79	67	75	4	76.40	82.32	71	85	75.0	25	60.0	2.5	6	9.0	23.0	15.0	17	9.5	28.5	12.5	26	8	8	6.6	24.6	11	8.0
58	63	83	70	78	4	79.58	85.50	74	85	75.0	25	60.0	2.5	6	9.0	23.0	15.0	18	10.5	28.5	12.5	26	8	8	6.6	24.6	11	8.0
60	65	85	72	80	4	82.75	88.67	77	95	75.0	25	60.0	2.5	6	9.0	23.0	15.0	18	10.5	28.5	12.5	26	8	8	6.6	24.6	11	8.0
63	68	88	75	83	4	85.93	91.85	80	95	75.0	25	60.0	2.5	6	9.0	23.0	15.0	18	10.5	28.5	12.5	26	8	8	6.6	24.6	11	8.0
65	70	90	77	85	4	85.93	91.85	83	95	76.0	25	61.0	2.5	6	9.0	23.0	15.0	18	10.5	28.5	12.5	26	8	8	6.6	24.6	11	10.0
70	75	98	83	92	4	89.10	95.02	88	95	81.0	28	63.0	2.5	7	9.0	26.0	18.0	19	11.5	30.5	14.5	26	8	8	6.6	24.6	11	10.0
75	80	103	88	97	4	98.63	104.55	93	105	86.0	28	68.0	2.5	7	9.0	26.0	18.0	19	11.5	30.5	14.5	26	10	8	6.6	24.6	11	10.0
80	85	109	95	105	4	101.80	107.72	98	105	86.0	28	68.0	3.0	7	9.0	26.2	18.2	19	11.5	30.2	14.0	26	10	8	6.6	24.6	11	10.0

\*)  $l_{1N}$  acc. to EN 12756 is bigger

inch size available from size 0.375 to 3.125

Note: Additional technical & dimensional information will be provided on request.

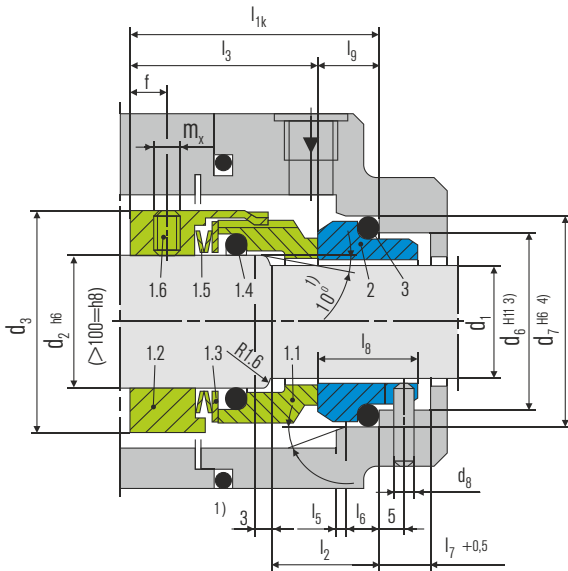


### Product Description

1. Balanced
2. Crest to Crest Wave spring or multiple springs rotating
3. For stepped shafts
4. Independent of direction of rotation
5. Integrated pumping device available (1-HAA5, 1-HFA5)
6. Single seal
7. Variant with cooled stationary seats available

### Technical Features

1. Flexibility in torque transmissions
2. Self cleaning effect
3. Short installation length also possible
4. Versatile application possibilities



### Typical Industrial Applications

Hot water applications  
Light hydrocarbons  
Oil and gas industry  
Petrochemical industry  
Power plant technology  
Refining technology  
Boiler feed pumps  
Process pumps

1) $d_1 > 100$ mm: 2 mm x 30°
2) $d_1 > 100$ mm: 30°
3) $d_1 > 100$ mm: +0.1
4) $d_1 > 100$ mm: HAA

### Standards

EN 12756

### Performance Capabilities

Sizes:  $d_1$  = Upto 100 mm (Upto 4.000")  
(Single spring:  $d_1$  = max. Upto 100 mm (Upto 4.000"))  
Pressure:  
 $p_1 = 80$  bar (1160 PSI) for  $d_1 = 14 \dots 100$  mm,  
 $p_1 = 25$  bar (363 PSI) for  $d_1 = 100 \dots 200$  mm,  
 $p_1 = 16$  bar (232 PSI) for  $d_1 > 200$  mm  
Temperature:  $t = -50$  °C ... 220 °C (-58 °F ... 428 °F)  
Speed = 20 m/s (66 ft/s)  
Permissible axial movement:  
 $d_1$  up to 22 mm:  $\pm 1.0$  mm  
 $d_1$  24 up to 58 mm:  $\pm 1.5$  mm  
 $d_1$  from 60 mm:  $\pm 2.0$  mm

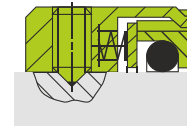
Item	Part no.	Description
1.1	472	Seal face
1.2	485	Drive collar
1.3	474	Thrust ring
1.4	412.1	O-Ring
1.5	477	Spring
1.6	904	Set screw
2	475	Seat (G9)
3	412.2	O-Ring

**DIN 24250**

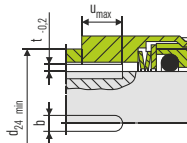
### Materials

Seal face: Silicon carbide (Q1, Q2), Carbon graphite antimony impregnated (A), Aluminium oxide (V), CrMo cast steel (S)  
Seat G9: Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B), Silicon carbide (Q1\*, Q2\*)  
Secondary seals: EPDM (E), NBR (P), FKM (V), FFKM (K)  
Springs: CrNiMo steel (G)  
Metal parts: CrNiMo steel (G), Duplex (G1)  
\* Cannot be combined with seal face made of S

### Torque Transmissions

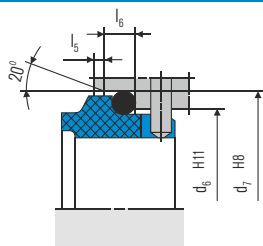


$d_1 > 100$  mm (4.000")  
Torque transmission by 4 set screws with cone point. Offset: 90°

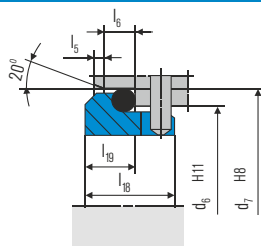


Drive key  
(1-HAA-S2 / 1-HFA-S2)

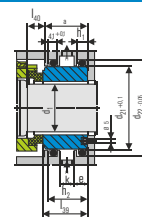
### Stationary Seats



**G9**  
(EN 12756)



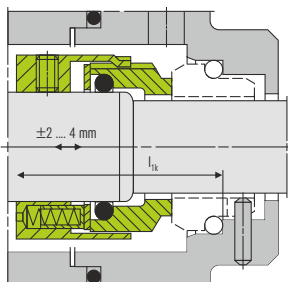
**G16**  
(EN 12756, but  $l_{1k}$   
and  $l_2$  are shorter  
than specified)



**6BBF**  
Cooled seat  
especially for hot  
water applications.

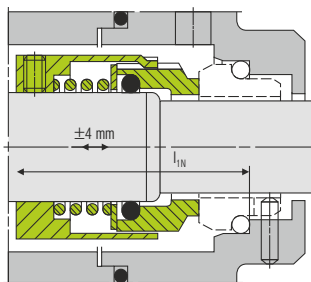
# DIE DICHTUNGS - COMPANY

## Design Variations



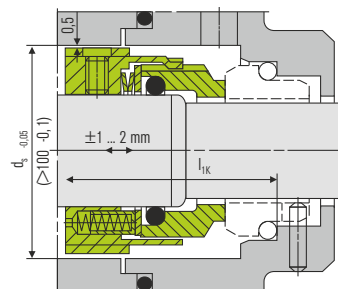
### 1-HFA

Shaft diameter: d1 = Upto 200 mm (Upto 7.875") As 1-HAA, but with multiple springs in sleeves (Item no. 1.5)  
Axial movement: ±2 ... 4 mm, dependent on diameter



### 1-HGA

Shaft diameter: d1 = Upto 100 mm (Upto 4.000")  
Dimensions, items and description as for 1-HAA, but with special single spring (Item no. 1.5) for compensating large axial movements (± 4 mm).



### 1-HAA-5

Shaft diameter: d1 = max. Upto 100 mm (Upto 4.000")  
Dimensions, items and descriptions as for 1-HAA, but with single spring and pumping screw.  
Dependent on direction of rotation. (Viscosity ≤ ISO VG10).

### 1-HFA-5

Shaft diameter: d1 = Upto 200 mm (Upto 7.875")  
Dimensions, items and descriptions as for 1-HAA, but with single spring and pumping screw.  
Dependent on direction of rotation. (Viscosity . ISO VG10).

## Dimensional Data

### Dimensions in millimeter

d1	d2	d3	d6	d7	d8	d24	d21	d22	ds	l1K	l1N	l2	l3	l5	l6	l7	l8	l9	l39	l40	A	b	e	f	h1	h2	k	mx	u_max	t
14*	18	33	21	25	3	20	-	-	38	42.5	-	18	32.5	1.5	4	8.5	17.5	10.0	-	-	-	5	-	6.0	-	-	-	M5	9	1.1
16*	20	35	23	27	3	22	-	-	40	42.5	-	18	32.5	1.5	4	8.5	17.5	10.0	-	-	-	5	-	6.0	-	-	-	M5	9	1.1
18*	22	37	27	33	3	24	-	-	42	45.0	55	20	33.5	2.0	5	9.0	19.5	11.5	-	-	-	6	-	7.0	-	-	-	M5	9	1.5
20*	24	39	29	35	3	26	-	-	44	45.0	60	20	33.5	2.0	5	9.0	19.5	11.5	-	-	-	6	-	5.5	-	-	-	M5	9	1.5
22*	26	41	31	37	3	28	-	-	45	45.0	60	20	33.5	2.0	5	9.0	19.5	11.5	-	-	-	6	-	8.0	-	-	-	M5	9	1.5
24*	28	43	33	39	3	30	-	-	47	47.5	60	20	36.0	2.0	5	9.0	19.5	11.5	-	-	-	6	-	5.5	-	-	-	M6	9	1.5
25*	30	45	34	40	3	32	-	-	49	47.5	60	20	36.0	2.0	5	9.0	19.5	11.5	-	-	-	6	-	5.5	-	-	-	M6	9	1.5
28*	33	48	37	43	3	35	44.65	50.57	51	50.0	65	20	38.5	2.0	5	9.0	19.5	11.5	24.0	8.5	24.0	6	8.0	8.0	6.6	22.6	9	M6	12	1.5
30*	35	50	39	45	3	37	47.83	53.75	54	50.0	65	20	38.5	2.0	5	9.0	19.5	11.5	24.0	9.0	24.0	6	8.0	8.0	6.6	22.6	9	M6	12	1.5
32*	38	55	42	48	3	40	47.83	53.75	59	50.0	65	20	38.5	2.0	5	9.0	19.5	11.5	24.5	9.0	24.0	6	8.0	8.0	6.6	22.6	9	M6	12	1.5
33*	38	55	42	48	3	40	47.83	53.75	59	50.0	65	20	38.5	2.0	5	9.0	19.5	11.5	24.5	9.0	24.0	6	8.0	8.0	6.6	22.6	9	M6	12	1.5
35*	40	57	44	50	3	42	51.00	56.92	61	50.0	65	20	38.5	2.0	5	9.0	19.5	11.5	24.5	9.0	24.0	6	8.0	8.0	6.6	22.6	9	M6	12	1.5
38*	43	60	49	56	4	45	54.18	60.10	65	52.5	75	23	38.5	2.0	6	9.0	22.0	14.0	26.0	11.0	24.0	6	8.0	8.0	6.6	22.6	9	M6	12	1.5
40*	45	62	51	58	4	47	60.53	66.45	66	52.5	75	23	38.5	2.0	6	9.0	22.0	14.0	26.0	11.0	24.0	6	8.0	8.0	6.6	22.6	9	M6	12	1.5
43*	48	65	54	61	4	50	63.70	69.62	69	52.5	75	23	38.5	2.0	6	9.0	22.0	14.0	26.0	11.0	24.0	6	8.0	8.0	6.6	22.6	9	M6	12	1.5
45*	50	67	56	63	4	52	63.70	69.62	71	52.5	75	23	38.5	2.0	6	9.0	22.0	14.0	26.0	11.0	24.0	6	8.0	8.0	6.6	22.6	9	M6	12	1.5
48*	53	70	59	66	4	55	66.88	72.80	75	52.5	85	23	38.5	2.0	6	9.0	22.0	14.0	26.0	11.0	24.0	6	8.0	8.0	6.6	22.6	9	M6	12	1.5
50*	55	72	62	70	4	57	70.05	75.97	76	57.5	85	25	42.5	2.5	6	9.0	23.0	15.0	26.5	12.5	24.0	6	8.0	8.0	6.6	24.6	9	M6	12	1.5
53*	58	79	65	73	4	60	76.40	82.32	83	57.5	85	25	42.5	2.5	6	9.0	23.0	15.0	26.5	12.5	24.0	8	8.0	9.0	6.6	24.6	9	M8	12	1.9
55*	60	81	67	75	4	62	76.40	82.32	85	57.5	85	25	42.5	2.5	6	9.0	23.0	15.0	28.5	12.5	26.0	8	8.0	9.0	6.6	24.6	11	M8	12	1.9
58*	63	84	70	78	4	65	79.58	85.50	88	62.5	85	25	47.5	2.5	6	9.0	23.0	15.0	28.5	12.5	26.0	8	8.0	9.0	6.6	24.6	11	M8	15	1.9
58*	65	86	72	80	4	67	82.75	88.67	95	62.5	95	25	47.5	2.5	6	9.0	23.0	15.0	28.5	12.5	26.0	8	8.0	9.0	6.6	24.6	11	M8	15	1.9
63*	68	89	75	83	4	70	85.93	91.85	93	62.5	95	25	47.5	2.5	6	9.0	23.0	15.0	28.5	12.5	26.0	8	8.0	9.0	6.6	24.6	11	M8	14	1.9
65*	70	91	77	85	4	72	85.93	91.85	95	62.5	95	25	47.5	2.5	6	9.0	23.0	15.0	28.5	12.5	26.0	8	8.0	9.0	6.6	24.6	11	M8	15	1.9
70*	75	99	83	92	4	77	89.10	95.02	105	70.0	95	28	52.0	2.5	7	9.0	26.0	18.0	30.5	14.5	26.0	8	8.0	10.0	6.6	24.6	11	M8	15	1.9
75*	80	104	88	97	4	82	98.63	104.55	109	70.0	105	28	52.0	2.5	7	9.0	26.0	18.0	30.5	14.5	26.0	8	8.0	10.0	6.6	24.6	11	M8	15	1.9
80*	85	109	95	105	4	87	101.80	107.72	114	70.0	105	28	51.8	3.0	7	9.0	26.2	18.2	30.2	14.0	26.0	8	8.0	10.0	6.6	24.6	11	M8	15	1.9
85*	90	114	100	110	4	92	108.15	114.07	119	75.0	105	28	56.8	3.0	7	9.0	26.2	18.2	30.2	14.0	26.0	10	8.0	10.0	6.6	24.6	11	M8	18	2.3
90*	95	119	105	115	4	97	114.50	120.42	124	75.0	105	28	56.8	3.0	7	9.0	26.2	18.2	30.2	14.0	26.0	10	8.0	10.0	6.6	24.6	11	M8	18	2.3
95*	100	124	110	120	4	102	117.68	123.60	129	75.0	105	28	57.8	3.0	7	9.0	25.2	17.2	29.2	14.0	26.0	10	8.0	10.0	6.6	24.6	11	M8	18	2.3
100*	105	129	115	125	4	107	124.03	129.95	134	75.0	105	28	57.8	3.0	7	9.0	25.2	17.2	29.2	14.0	26.0	10	8.0	10.0	6.6	24.6	11	M8	18	2.3
105*	115	148	122.2	134.3	5	118	128.98	134.90	153	73.0	-	32	53.0	2.0	10	-	30.0	20.0	29.2	15.2	26.0	10	8.0	10.0	6.6	24.6	11	M8	18	2.3
110*	120	153	128.2	140.3	5	123	135.30	141.20	158	73.0	-	32	53.0	2.0	10	-	30.0	20.0	32.5	14.5	30.0	10	9.5	10.0	6.6	28.6	13	M8	18	2.3
115*	125	158	136.2	148.3	5	128	140.30	146.20	163	73.0	-	32	53.0	2.0	10	-	30.0	20.0	32.5	14.5	30.0	10	9.5	10.0	6.6	28.6	13	M8	18	2.3
120*	130	163	138.2	150.3	5	133	145.30	151.20	168	73.0	-	32	53.0	2.0	10	-	30.0	20.0	32.5	14.5	30.0	10	9.5	10.0	6.6	28.6	13	M8	18	2.3
125*	135	168	142.2	154.3	5	138	150.30	156.20	173	73.0	-	32	53.0	2.0	10	-	30.0	20.0	32.5	14.5	30.0	10	9.5	10.0	6.6	28.6	13	M8	18	2.3
130*	140	173	146.2	158.3	5	143	155.30	161.20	178	73.0	-	32	53.0	2.0	10	-	30.0	20.0	32.5	14.5	30.0	10	9.5	10.0	6.6	28.6	13	M8	18	2.3
135*	145	178	152.2	164.3	5	148	160.30	166.20	183	73.0	-	32	53.0	2.0	10	-	30.0	20.0	32.5	14.5	30.0	10	9.5	10.0	6.6	28.6	13	M8	18	2.3
140*	150	183	156.2	168.3	5	153	165.30	171.20	188	73.0	-	32	53.0	2.0	10	-	30.0	20.0	32.5	14.5	30.0	10	9.5	10.0	6.6	28.6	13	M8	18	2.3
145*	155	191	161.2	173.3	5	158	172.30	178.20	196	83.0	-	34	63.0	2.0	10	-	30.0	20.0	34.5	16.5	32.0	12	10.0	12.0	7.1	30.1	14	M8	22	2.1
150*	160	196	168.2	180.3	5	163	177.30	183.20	201	85.0	-	36	63.0	2.0	10	-	32.0	22.0	34.5	16.5	32.0	12	10.0	12.0	7.1	30.1	14	M8	22	2.1
155*	165	201	173.2	185.3	5	168	182.30	188.20	206	87.0	-	38	63.0	2.0	12	-	34.0	24.0	34.5	16.5	32.0	12	10.0	12.0	7.1	30.1	14	M8	22	2.1
160*	170	206	178.2	190.3	5	173	187.30	193.20	211	87.0	-	38	63.0	2.0	12	-	34.0	24.0	34.5	16.5	32.0	12	10.0	12.0	7.1	30.1	14	M8	22	2.1
165*	175	211	183.2	195.3	5	178	192.30	198.20	216	87.0	-	38	63.0	2.0	12	-	34.0	24.0	34.5	16.5	32.0	12	10.0	12.0	7.1	30.1	14	M8	22	2.1
170*	180	216	188.2	200.3	5	183	197.30	203.20	221	87.0	-	38	63.0	2.0	12	-	34.0	24.0	37.0	16.5	34.5	12	10.0	12.0	7.1	32.1	16	M8	22	2.1
175*	185	221	193.2	205.3	5	188	202.30	208.20	226	87.0	-	38	63.0	2.0	12	-	34.0	24.0	37											

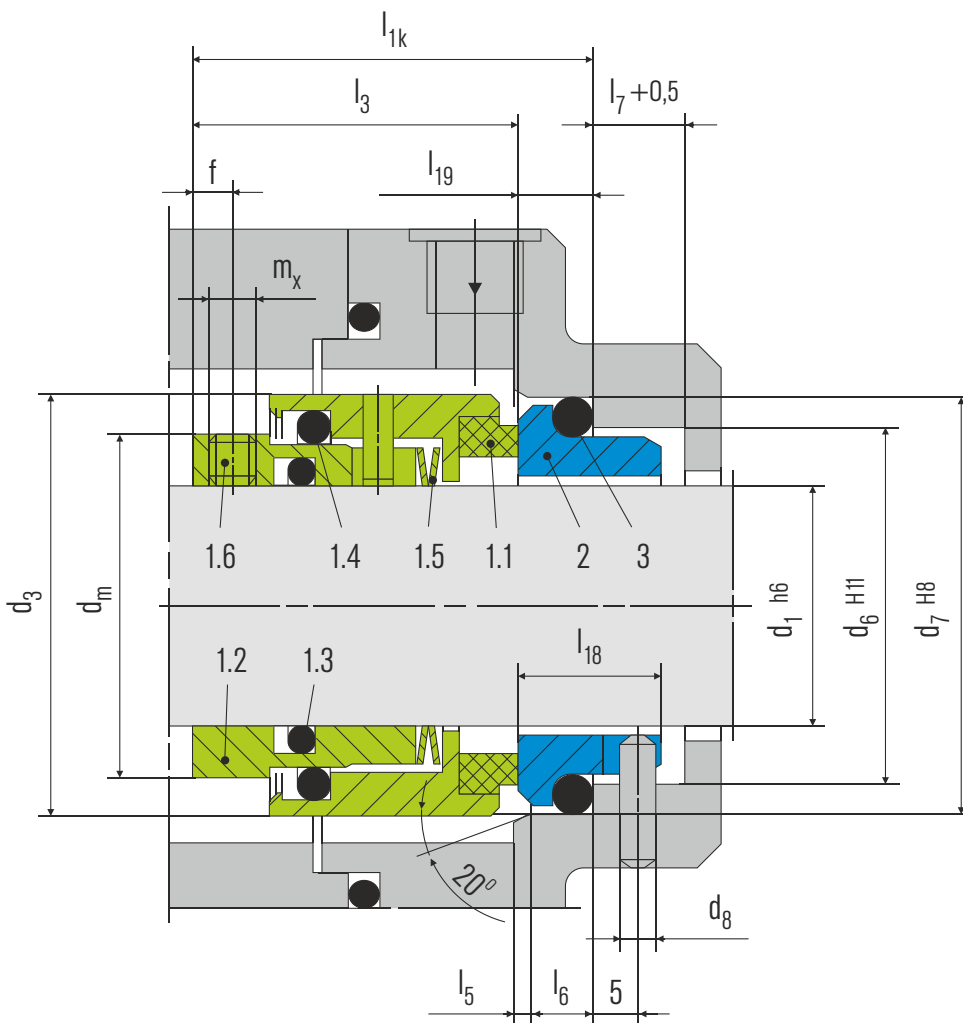


### Product Description

1. Balanced
2. Encapsulated rotating spring
3. For shafts without a step
4. Independent of direction of rotation
5. Single seal

### Technical Features

1. Especially designed for medias with solids and highly viscosity
2. No damage of the shaft by dynamically loaded O-Ring
3. Rugged and reliable design
4. Springs are protected from the product
5. Versatile applications including sterile & vacuum



### Typical Industrial Applications

Conveying and bottling of dairy products  
 Dirty, abrasive and solids containing media  
 Pulp and paper industry  
 Sugar industry  
 Water and waste water technology  
 Raw sludge pumps  
 Raw sludge, sewage slurries  
 Thick juice pumps

### Performance Capabilities

Sizes:  $d_1 =$  Upto 100 mm (Upto 4.000")  
 Pressure:  $p_1^* =$  0.8 abs... 25 bar (1.2 abs... 363 PSI)  
 Temperature:  $t =$  -50 °C...+220 °C (-58 °F...+430 °F)  
 Speed = 20 m/s (66 ft/s)  
 Permissible axial movement:  $\pm 0.5$  mm

### Standards

EN 12756

### Notes

Variant for sterile applications available.  
 Please enquire.

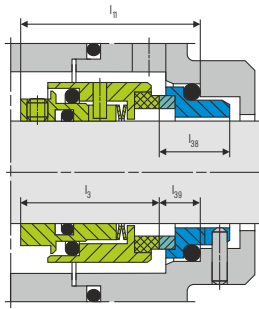
### Materials

Seal face: Carbon graphite antimony impregnated (A),  
 Carbon graphite resin impregnated (B)  
 Seat G16: Silicon carbide (Q1)

Item	Part no.	Description
1.1	472/473	Seal face
1.2	485	Drive collar
1.3	412.2	O-Ring
1.4	412.1	O-Ring
1.5	477	Spring
1.6	904	Set screw
2	475	Seat (G16)
3	412.3	O-Ring

**DIN 24250**

## Design Variations

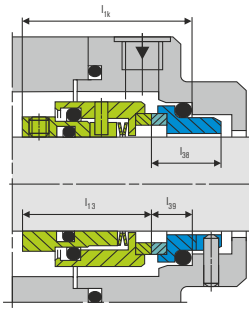


### 79-JCH6-13

Items and description as 79JC-13.  
 Seal face: Carbon graphite antimony impregnated (A),  
 Carbon graphite resin impregnated (B)  
 Seat G46: Silicon carbide (Q12)  
 Installations length  $l_{11}$  ( $= l_3 + l_{39}$ ) is longer than  $l_{1k}$ .

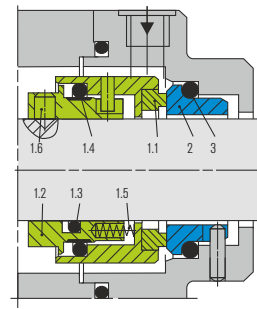
### 79-JHA6-13F

Items and description as 79JC-13.  
 Seal face: Silicon carbide (Q12)  
 Seat G16: Silicon carbide (Q1)  
 Installations length  $l_{12}$  ( $= l_{13} + l_{19}$ )  
 is shorter than  $l_{1k}$ .



### 79JHH6-13

Items and description as 79JC-13.  
 Seal face: Silicon carbide (Q12)  
 Seat G46: Silicon carbide (Q12)  
 Installation length  $l_{1k}$   
 Operating range:  
 Temperature:  $t = -20\text{ °C} \dots +180\text{ °C}$  ( $-4\text{ °F} \dots +356\text{ °F}$ )  
 Sliding velocity:  $V_g = 10\text{ m/s}$  (33 ft/s)



### 79-EAA

Mechanical seals with product-protected multiple  
 springs, for high pressure applications.  
 Pressure:  $p = \text{max. } 50\text{ bar}$  (725 PSI)  
 Shaft diameter:  $d_1 > \text{Upto } 100\text{ mm}$  (Upto 4.000")  
 Smaller diameters and higher pressures on request.

## Dimensional Data

### Dimensions in millimeter

$d_1$	$d_3$	$d_6$	$d_7$	$d_8$	$d_m$	$l_{1k}$	$l_3$	$l_5$	$l_6$	$l_7$	$l_{18}$	$l_{19}$	$l_{11}^{(1)}$	$l_{12}^{(2)}$	$l_{13}$	$l_{38}$	$l_{39}$	$f$	$m_x$
18	32	27	33	3	26.0	37.5	30.5	2.0	5	9	15.0	7.0	39.5	35.5	28.5	17.0	9.0	3.0	M4
20	34	29	35	3	28.0	37.5	30.5	2.0	5	9	15.0	7.0	39.5	35.5	28.5	17.0	9.0	3.0	M4
22	36	31	37	3	30.0	37.5	30.5	2.0	5	9	15.0	7.0	39.5	35.5	28.5	17.0	9.0	3.0	M4
24	38	33	39	3	32.5	40.0	33.0	2.0	5	9	15.0	7.0	42.0	38.0	31.0	17.0	9.0	3.5	M5
25	39	34	40	3	33.5	40.0	33.0	2.0	5	9	15.0	7.0	42.0	38.0	31.0	17.0	9.0	3.5	M5
28	42	37	43	3	36.5	42.5	35.5	2.0	5	9	15.0	7.0	45.0	40.0	33.0	17.5	9.5	3.5	M5
30	44	39	45	3	38.5	42.5	35.5	2.0	5	9	15.0	7.0	45.0	40.0	33.0	17.5	9.5	3.5	M5
32	47	42	48	3	41.5	42.5	35.5	2.0	5	9	15.0	7.0	45.0	40.0	33.0	17.5	9.5	3.5	M5
33	47	42	48	3	41.5	42.5	35.5	2.0	5	9	15.0	7.0	45.0	40.0	33.0	17.5	9.5	3.5	M5
35	49	44	50	3	43.5	42.5	35.5	2.0	5	9	15.0	7.0	45.0	40.0	33.0	17.5	9.5	3.5	M5
38	54	49	56	4	47.5	45.0	37.0	2.0	6	9	16.0	8.0	47.5	42.5	34.5	18.5	10.5	4.0	M5
40	56	51	58	4	49.5	45.0	37.0	2.0	6	9	16.0	8.0	47.5	42.5	34.5	18.5	10.5	4.0	M5
43	59	54	61	4	52.5	45.0	37.0	2.0	6	9	16.0	8.0	47.5	42.5	34.5	18.5	10.5	4.0	M5
45	61	56	63	4	54.5	45.0	37.0	2.0	6	9	16.0	8.0	47.5	42.5	34.5	18.5	10.5	4.0	M5
48	64	59	66	4	57.5	45.0	37.0	2.0	6	9	16.0	8.0	47.5	42.5	34.5	18.5	10.5	4.0	M5
50	66	62	70	4	59.5	47.5	38.0	2.5	6	9	17.0	9.5	50.0	45.0	35.5	19.5	12.0	4.5	M6
53	69	65	73	4	62.5	47.5	38.0	2.5	6	9	17.0	9.5	50.0	45.0	35.5	19.5	12.0	4.5	M6
55	71	67	75	4	64.5	47.5	38.0	2.5	6	9	17.0	9.5	50.0	45.0	35.5	19.5	12.0	4.5	M6
58	78	70	78	4	68.5	52.5	42.0	2.5	6	9	18.0	10.5	55.0	50.0	39.5	20.5	13.0	4.5	M6
60	80	72	80	4	70.5	52.5	42.0	2.5	6	9	18.0	10.5	55.0	50.0	39.5	20.5	13.0	4.5	M6
63	83	75	83	4	73.5	52.5	42.0	2.5	6	9	18.0	10.5	55.0	50.0	39.5	20.5	13.0	4.5	M6
65	85	77	85	4	75.5	52.5	42.0	2.5	6	9	18.0	10.5	55.0	50.0	39.5	20.5	13.0	4.5	M6
68	88	81	90	4	78.5	52.5	41.5	2.5	7	9	18.5	11.0	55.0	50.0	39.0	21.0	13.5	4.5	M6
70	90	83	92	4	80.5	60.0	48.5	2.5	7	9	19.0	11.5	62.5	57.5	46.0	21.5	14.0	5.0	M6
75	99	88	97	4	89.0	60.0	48.5	2.5	7	9	19.0	11.5	62.5	57.5	46.0	21.5	14.0	5.5	M8
80	104	95	105	4	94.0	60.0	48.5	3.0	7	9	19.0	11.5	62.5	57.5	46.0	21.5	14.0	5.5	M8
85	109	100	110	4	99.0	60.0	48.5	3.0	7	9	19.0	11.5	62.5	57.5	46.0	21.5	14.0	5.5	M8
90	114	105	115	4	104.0	65.0	52.0	3.0	7	9	20.5	13.0	67.5	62.5	49.5	23.0	15.5	5.5	M8
95	119	110	120	4	109.0	65.0	52.0	3.0	7	9	20.5	13.0	67.5	62.5	49.5	23.0	15.5	5.5	M8
100	124	115	125	4	114.0	65.0	52.0	3.0	7	9	20.5	13.0	67.5	62.5	49.5	23.0	15.5	5.5	M8

inch size available from size 0.750 to 4.000

Note: Additional technical & dimensional information will be provided on request.



### Product Description

1. Balanced
2. Dual seal
3. For stepped shafts
4. Independent of direction of rotation
5. Rotating multiple springs
6. Seal concept based on the B700 range
7. Variant with pumping screw available (1-HEA5-3)

### Technical Features

1. Flexibility in torque transmissions
2. Pumping screw for media with higher viscosity also possible
3. Self cleaning effect
4. Short installation length possible
5. Suitable for media with low solids contents
6. EN 12756 (For connection dimensions d1 upto 100 mm)

### Typical Industrial Applications

Adhesives  
 Chemical industry  
 Media with poor lubrication properties  
 Medias with low solids content and abrasive particles  
 Process industry  
 Toxic and hazardous media  
 Chemical standard pumps

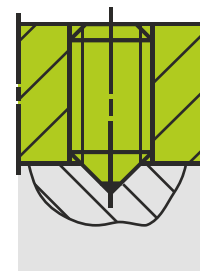
### Performance Capabilities

Sizes: d1 = Upto 200 mm (Upto 7.875")  
 Pressure:  
 p1 = 80 bar (1 160 PSI) for d1 = 14 ... 100 mm,  
 p1 = 25 bar (363 PSI) for d1 = 100 ... 200 mm,  
 p1 = 16 bar (232 PSI) for d1 > 200 mm  
 Temperature: t = -50 °C ... 220 °C (-58 °F ... 428 °F)  
 Speed = 20 m/s (66 ft/s)  
 Permissible axial movement:  
 d1 up to 100 mm: ± 0.5 mm  
 d1 from 100 mm: ± 2.0 mm

### Standards

EN 12756

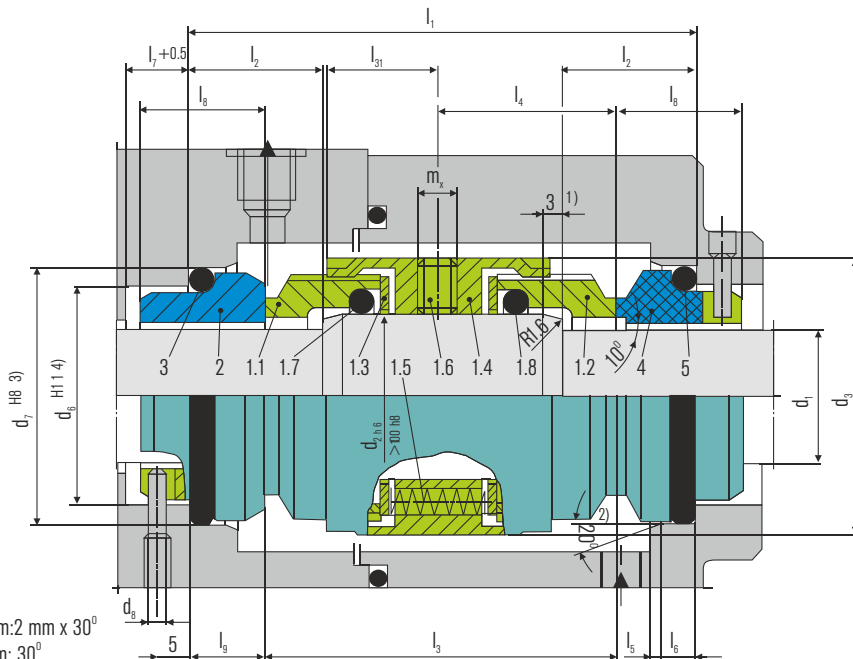
### Torque Transmission



d<sub>2</sub> ≥ 105 mm VIA 4 set screws with cone points.  
 (standard arrangement)

### Materials

Seal face: Silicon carbide (Q1, Q2), Carbon graphite antimony impregnated (A), Aluminium oxide (V), Special cast CrMo steel (S)  
 Seat G9: Carbon graphite antimony impregnated (A), Carbon graphite resin impregnated (B), Silicon carbide (Q1\*, Q2\*)  
 Secondary seals: EPDM (E), NBR (P), FKM (V), FFKM (K)  
 Springs: CrNiMo steel (G)  
 Metal parts: CrNiMo steel (G), Duplex (G1)  
 \* Cannot be combined with seal face made of S



- 1) > d<sub>1</sub> 100mm: 2 mm x 30°
- 2) > d<sub>1</sub> 100mm: 30°
- 3) d<sub>1</sub> > 100 : B700
- 4) d<sub>1</sub> > 100 : +0.1

Item	Part no.	Description
1.1	472.1	Seal face
1.2	472.2	Seal face
1.3	474	Thrust ring
1.4	485	Drive collar
1.5	477	Spring
1.6	904	Set screw
1.7	412.1	O-Ring
1.8	412.2	O-Ring
2	475.1	Seat (G9)
3	412.3	O-Ring
4	475.2	Seat (G9)
5	412.4	O-Ring

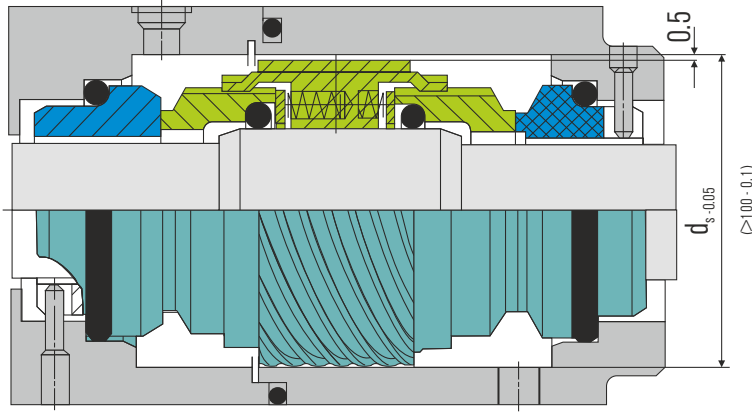
**DIN 24250**

1) d1 > 100 mm: 2 mm x 30°
2) d1 > 100 mm: 30°
3) d1 > 100 mm: B700
4) d1 > 100 mm: +0.1



# DIE DICHTUNGS - COMPANY

## Design Variations



### 1-HEA5-3

Dimensions, items and descriptions as for 1-HEA-3, but with pumping screw (Item no. 1.4)  
Dependent on direction of rotation.

## Dimensional Data

### Dimensions in millimeter

d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>6</sub>	d <sub>7</sub>	d <sub>8</sub>	d <sub>11</sub>	d <sub>12</sub>	d <sub>s</sub>	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>5</sub>	l <sub>6</sub>	l <sub>7</sub>	l <sub>8</sub>	l <sub>9</sub>	l <sub>12</sub>	l <sub>14</sub>	l <sub>10</sub>	l <sub>15</sub>	l <sub>28</sub>	l <sub>16</sub>	l <sub>31</sub>	m <sub>x</sub>	R	
14	18	33	21	25	3	24.0	30	-	73	18	53	26.5	1.5	4	8.5	17.5	10	6.5	5.6	7.5	1.5	6.6	5	17	M5	1.2	
16	20	35	23	27	3	29.5	35	-	73	18	53	26.5	1.5	4	8.5	17.5	10	8.5	7.5	7.5	1.5	6.6	5	17	M5	1.5	
18	22	37	27	33	3	29.5	35	42	76	20	53	26.5	2	5	9	19.5	11.5	9	8	8.5	1.5	7.5	5	17	M5	1.5	
20	24	39	29	35	3	32.0	38	44	76	20	53	26.5	2	5	9	19.5	11.5	8.5	7.5	8.5	1.5	7.5	5	17	M5	1.5	
22	26	41	31	37	3	32.0	38	45	76	20	53	26.5	2	5	9	19.5	11.5	8.5	7.5	8.5	1.5	7.5	5	17	M5	1.5	
24	28	43	33	39	3	36.0	42	47	77	20	54	27	2	5	9	19.5	11.5	8.5	7.5	8.5	1.5	7.5	5	17.5	M6	1.5	
25	30	45	34	40	3	39.2	45	49	77	20	54	27	2	5	9	19.5	11.5	8.5	7.5	8.5	1.5	7.5	5	17.5	M6	1.5	
28	33	48	37	43	3	42.2	48	51	77	20	54	27	2	5	9	19.5	11.5	10	9	8.5	1.5	7.5	5	17.5	M6	1.5	
30	35	50	39	45	3	44.2	50	54	77	20	54	27	2	5	9	19.5	11.5	11.5	10.5	8.5	1.5	7.5	5	17.5	M6	1.5	
32	38	55	42	48	3	46.2	52	59	79	20	56	28	2	5	9	19.5	11.5	11.5	10.5	8.5	1.5	7.5	5	18.5	M6	1.5	
33	38	55	42	48	3	49.2	55	59	79	20	56	28	2	5	9	19.5	11.5	12	10.5	8.5	1.5	7.5	5	18.5	M6	1.5	
35	40	57	44	50	3	52.2	58	61	80	20	57	28.5	2	5	9	19.5	11.5	12	11	8.5	1.5	7.5	5	19	M6	1.5	
38	43	60	49	56	4	53.3	62	65	85	23	57	28.5	2	6	9	22	14	11.3	10.3	10	2	9	6	19	M6	1.5	
40	45	62	51	58	4	55.3	64	66	85	23	57	28.5	2	6	9	22	14	11.8	10.8	10	2	9	6	19	M6	1.5	
43	48	65	54	61	4	59.7	68.4	69	85	23	57	28.5	2	6	9	22	14	13.2	12	10	2	9	6	19	M6	2.5	
45	50	67	56	63	4	60.8	69.3	71	84	23	56	28	2	6	9	22	14	12.8	11.6	10	2	9	6	19.5	M6	2.5	
48	53	70	59	66	4	63.8	72.3	75	84	23	56	28	2	6	9	22	14	12.8	11.6	10	2	9	6	19.5	M6	2.5	
50	55	72	62	70	4	66.5	75.4	76	93	25	63	31.5	2.5	6	9	23	15	12.8	11.6	10.5	2	9.5	6	19.5	M6	2.5	
53	58	79	65	73	4	69.5	78.4	83	97	25	67	33.5	2.5	6	9	23	15	13.5	12.3	12	2	11	6	23.5	M8	2.5	
55	60	81	67	75	4	71.5	80.4	85	97	25	67	33.5	2.5	6	9	23	15	14.5	13.3	12	2	11	6	23.5	M8	2.5	
58	63	84	70	78	4	74.5	83.4	88	104	25	74	37	2.5	6	9	23	15	14.5	13.3	12	2	11	6	24.5	M8	2.5	
60	65	86	72	80	4	76.5	85.4	95	104	25	74	37	2.5	6	9	23	15	14.5	13.3	12	2	11	6	24.5	M8	2.5	
63	68	89	75	83	4	82.7	91.5	93	109	25	79	39.5	2.5	6	9	23	15	14.2	13.3	12	2	11	6	24.5	M8	2.5	
65	70	91	77	85	4	83.0	92.0	95	98	25	68	34	2.5	6	9	23	15	14.2	13	12	2	11	6	23.5	M8	2.5	
70	75	99	83	92	4	90.2	99.0	105	112.5	28	76.4	38.2	2.5	7	9	26	18	14.9	13.7	12.5	2	11.3	6	25.5	M8	2.5	
75	80	104	88	97	4	95.2	104.0	109	112.5	28	76.4	38.2	2.5	7	9	26	18	14.2	13	12.5	2	11.3	6	25.5	M8	2.5	
80	85	109	95	105	4	100.2	109.0	114	112.5	28	76	38	3	7	9	26.2	18.2	15.2	14	12.5	2	11.3	6	25	M8	2.5	
85	90	114	100	110	4	105.2	114.0	119	112.5	28	76	38	3	7	9	26.2	18.2	16.2	15	13	2	12	6	25.5	M8	2.5	
90	95	119	105	115	4	111.6	120.3	124	112.5	28	76	38	3	7	9	26.2	18.2	16	14.8	15	2	14	6	25	M8	2.5	
95	100	124	110	120	4	114.5	123.3	129	110.5	28	76	38	3	7	9	25.2	17.2	16	14.8	15	2	14	6	25	M8	2.5	
100	105	129	115	125	4	-	-	134	110.5	28	76	38	3	7	9	25.2	17.2	17	15.8	15	-	14	-	25.5	M8	2.5	
105	115	148	122.2	134.3	5	-	-	153	122	32	82	41	2	10	-	30	20	17	15.8	15	-	14	-	31.5	M8	2.5	
110	120	153	128.2	140.3	5	-	-	158	122	32	82	41	2	10	-	30	20	-	-	-	-	-	-	31.5	M8	-	
115	125	158	136.2	148.3	5	-	-	163	122	32	82	41	2	10	-	30	20	-	-	-	-	-	-	31.5	M8	-	
120	130	163	138.2	150.3	5	-	-	168	122	32	82	41	2	10	-	30	20	-	-	-	-	-	-	31.5	M8	-	
125	135	168	142.2	154.3	5	-	-	173	122	32	82	41	2	10	-	30	20	-	-	-	-	-	-	31.5	M8	-	
130	140	173	146.2	158.3	5	-	-	178	122	32	82	41	2	10	-	30	20	-	-	-	-	-	-	31.5	M8	-	
135	145	178	152.2	164.3	5	-	-	183	122	32	82	41	2	10	-	30	20	-	-	-	-	-	-	31.5	M8	-	
140	150	183	156.2	168.3	5	-	-	188	122	32	82	41	2	10	-	30	20	-	-	-	-	-	-	31.5	M8	-	
145	155	191	161.2	173.3	5	-	-	196	133	34	93	46.5	2	10	-	30	20	-	-	-	-	-	-	35.5	M8	-	
150	160	196	168.2	180.3	5	-	-	201	137	36	93	46.5	2	10	-	32	22	-	-	-	-	-	-	35.5	M8	-	
155	165	201	173.2	185.3	5	-	-	206	141	38	93	46.5	2	12	-	34	24	-	-	-	-	-	-	35.5	M8	-	
160	170	206	178.2	190.3	5	-	-	211	141	38	93	46.5	2	12	-	34	24	-	-	-	-	-	-	35.5	M8	-	
165	175	211	183.2	195.3	5	-	-	216	141	38	93	46.5	2	12	-	34	24	-	-	-	-	-	-	35.5	M8	-	
170	180	216	188.2	200.3	5	-	-	221	141	38	93	46.5	2	12	-	34	24	-	-	-	-	-	-	35.5	M8	-	
175	185	221	193.2	205.3	5	-	-	226	141	38	93	46.5	2	12	-	34	24	-	-	-	-	-	-	35.5	M8	-	
180	190	226	207.5	219.3	5	-	-	231	149	42	93	46.5	2	12	-	38	28	-	-	-	-	-	-	35.5	M8	-	
185	195	231	212.5	224.3	5	-	-	236	149	42	93	46.5	2	12	-	38	28	-	-	-	-	-	-	35.5	M8	-	
190	200	236	217.5	229.3	5	-	-	241	149	42	93	46.5	2	12	-	38	28	-	-	-	-	-	-	35.5	M8	-	
195	205	245	222.5	234.3	5	-	-	250	151	43	95	47.5	2	12	-	38	28	-	-	-	-	-	-	-	M10	-	
200	210	250	227.5	239.3	5	-	-	255	151	43	95	47.5	2	12	-	38	28	-	-	-	-	-	-	-	-	-	-

d<sub>1</sub> > 200 on request

inch size available from size 0.625 to 7.875

Note: Additional technical & dimensional information will be provided on request.

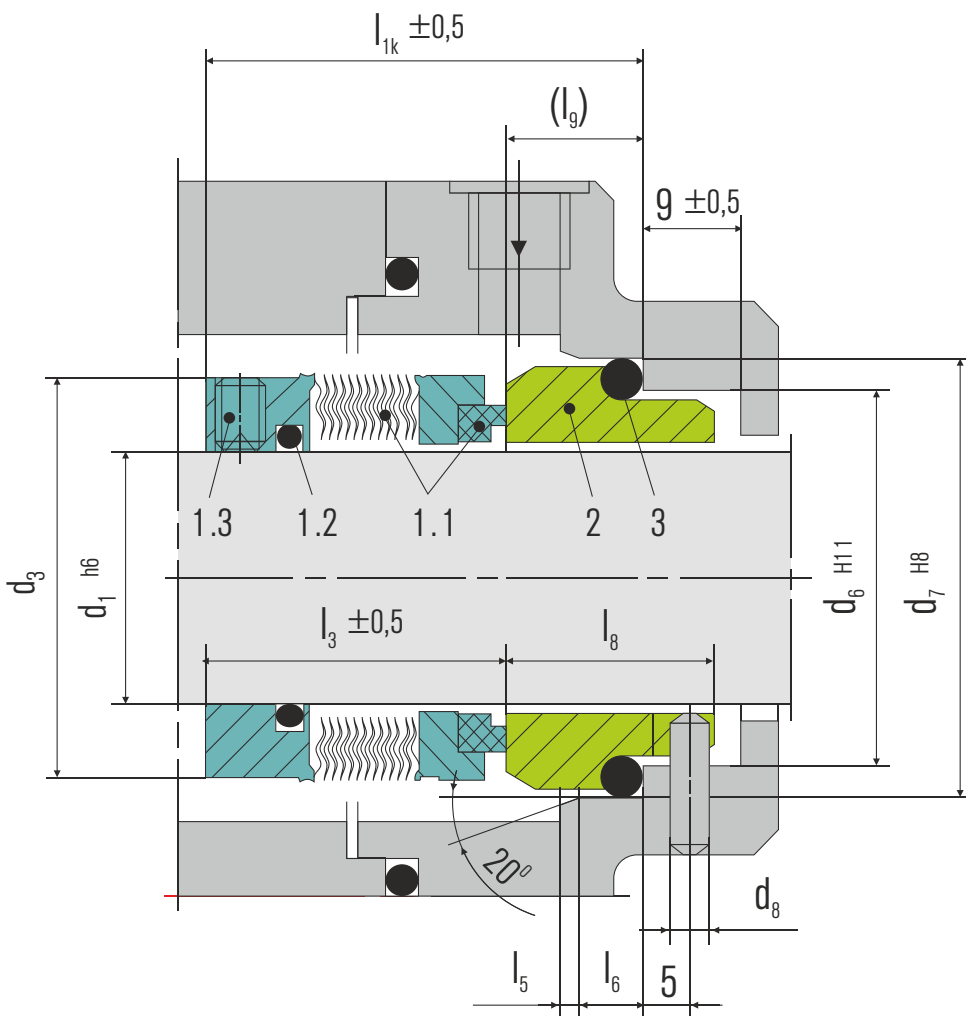


**Product Description**

1. Balanced
2. For shafts without a step
3. Independent of direction of rotation
4. Metal bellows rotating
5. Single seal

**Technical Features**

1. For extreme temperature ranges
2. No dynamically loaded O-Ring
3. Pumping screw for highly viscous media available
4. Self cleaning effect
5. Short installation length possible



**Typical Industrial Applications**

- Chemical industry
- Cold media
- Highly viscous media
- Hot media
- Power plant technology
- Refining technology

**Standards**

EN 12756

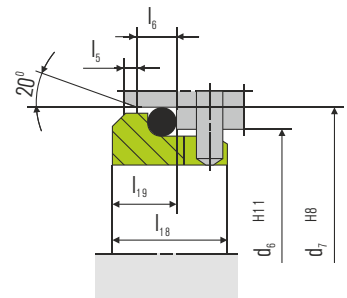
**Performance Capabilities**

Sizes:  $d_1 =$  Upto 100 mm (Upto 4.000")  
 Externally pressurized:  
 $p_1 = \dots$  25 bar (363 PSI)  
 Internally pressurized:  
 $p_1 < 120$  °C (248 °F) 10 bar (145 PSI)  
 $p_1 < 220$  °C (428 °F) 5 bar (72 PSI)  
 Temperature:  $t = -40$  °C  $\dots$  +220 °C (-40 °F  $\dots$  428) °F  
 Stationary seat lock necessary.  
 Speed = 20 m/s (66 ft/s)

**Materials**

Seal face: Carbon graphite antimony impregnated (A), Silicon carbide (Q12)  
 Seat: Silicon carbide (Q1)  
 Bellows: Inconel® 718 hardened (M6), Hastelloy® C-276 (M5)  
 Metal parts: CrNiMo steel (G), Duplex (G1), Hastelloy® C-4 (M)

**Stationary Seats**



**G16**  
 ( $l_{1k}$  shorter than specified by EN 12756)

Item	Part no.	Description
1.1	472/481	Seal face with bellows unit
1.2	412.1	O Ring
1.3	904	Set Screw
2	475	Seat (G9)
3	412.2	O Ring
<b>DIN 24250</b>		

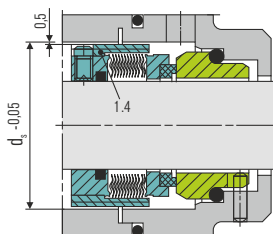
## Design Variations

### JAA-13

Shaft diameter:  $d_1 =$  Upto 100 mm (Upto 4.000")  
 Internally pressurized:  $p_1 = \dots$  16 bar (232 PSI),  
 stationary seat lock necessary.  
 Externally pressurized:  $p_1 =$  10 bar (145 PSI)  
 Temperature:  $t = -40$  °C ..  $+220$  °C ( $-40$  °F  $+428$  °F)  
 Sliding velocity:  $v_g =$  20 m/s (66 ft/s)

### IFA-15 / JAA-15

Version with pumping ring. Dependent on direction of rotation. Can be retrofitted.



### IFA-5

Dimensions, items and description as for IFA-13, but with pumping screw (item no. 1.4). Dependent on direction of rotation. The pumping screw can be retrofitted.

## Dimensional Data

### Dimensions in millimeter

$d_1$	$d_3$	$d_6$	$d_7$	$d_8$	$d_s$	$l_{1k}$	$l_3$	$l_5$	$l_6$	$l_8$	$l_9$	$l_{18}$	$l_{19}$	$b$	$s$
16	30	23	27	3	38	42.5*	32.5	1.5	4	17.5	10	-	-	1.6	9.0
18	32	27	33	3	39	42	30.5	2	5	14	11.5	15	7.0	1.6	10.0
20	33.5	29	35	3	41	42	30.5	2	5	14	11.5	15	7.0	1.6	10.0
22	36.5	31	37	3	44	42	30.5	2	5	14	11.5	15	7.0	1.6	10.0
24	39	33	39	3	47	40	28.5	2	5	19.5	11.5	15	7.0	1.6	8.2
25	39.6	34	40	3	48	40	28.5	2	5	19.5	11.5	15	7.0	1.6	8.5
28	42.8	37	43	3	51	42.5	31	2	5	19.5	11.5	15	7.0	1.6	9.0
30	45	39	45	3	53	42.5	31	2	5	19.5	11.5	15	7.0	1.6	8.5
32	46	42	48	3	55	42.5	31	2	5	19.5	11.5	15	7.0	1.6	9.2
33	48	42	48	3	56	42.5	31	2	5	19.5	11.5	15	7.0	1.6	9.2
35	49.2	44	50	3	58	42.5	31	2	5	19.5	11.5	15	7.0	1.6	9.5
38	52.3	49	56	4	61	45	31	2	6	22	14	16	8.0	1.6	9.2
40	55.5	51	58	4	64	45	31	2	6	22	14	16	8.0	1.6	9.2
43	57.5	54	61	4	67	45	31	2	6	22	14	16	8.0	1.6	9.2
45	58.7	56	63	4	69	45	31	2	6	22	14	16	8.0	1.6	9.5
48	61.9	59	66	4	72	45	31	2	6	22	14	16	8.0	1.6	9.2
50	65	62	70	4	74	47.5	32.5	2.5	6	23	15	17	9.5	1.6	10.5
53	68.2	65	73	4	77	47.5	32.5	2.5	6	23	15	17	9.5	1.6	10.5
55	70	67	75	4	80	47.5	32.5	2.5	6	23	15	17	9.5	1.6	10.0
58	71.7	70	78	4	83	52.5	37.5	2.5	6	23	15	18	10.5	3.0	14.0
60	74.6	72	80	4	85	52.5	37.5	2.5	6	23	15	18	10.5	3.0	14.0
63	79	75	83	4	88	52.5	37.5	2.5	6	23	15	18	10.5	3.0	14.0
65	84.1	77	85	4	95	52.5	37.5	2.5	6	23	15	18	10.5	3.0	14.0
68	87.3	81	90	4	96	52.5	34.5	2.5	7	26	18	18.5	11.0	1.6	10.0
70	87.3	83	92	4	96	60	42	2.5	7	26	18	19	11.5	3.0	17.0
75	95	88	97	4	104	60	42	2.5	7	26	18	19	11.5	3.0	16.0
80	98.4	95	105	4	109	60	41.8	3	7	26.2	18.2	19	11.5	3.0	16.0
85	104.7	100	110	4	114	60	41.8	3	7	26.2	18.2	19	11.5	3.0	16.0
90	111	105	115	4	119	65	46.8	3	7	26.2	18.2	20.5	13.0	3.0	21.0
95	114	110	120	4	124	65	47.8	3	7	25.2	17.2	20.5	13.0	3.0	21.0
100	117.4	115	125	4	129	65	47.8	3	7	25.2	17.2	20.5	13.0	3.0	20.0

\* Installation length is longer than  $l_{1k}$  specified by EN 12756

inch size available from size 0.625 to 4.000

Note: Additional technical & dimensional information will be provided on request.

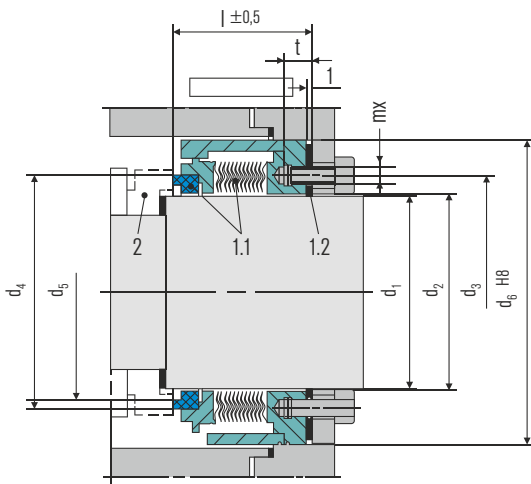


**Product Description**

1. Balanced
2. Independent of direction of rotation
3. Single Seal
4. Stationary bellows

**Technical Features**

1. For high temperature
2. High sliding velocities
3. No elastomer secondary seals



**Design Variations**

**GFA**

Shaft diameter:  $d_1 =$  Upto 100 mm (Upto 4.000"),  $>100$  mm on request  
 Internally pressurized:  $p_1 = 16$  bar (232 PSI), (higher pressure possible, please enquire)  
 Externally pressurized:  $p_1 = 10$  bar (145 PSI), stationary seat lock necessary.  
 Temperature:  $t = -20$  °C ...  $+400$  °C (-4 °F ...  $+752$  °F)  
 Sliding velocity:  $vg = 50$  m/s (165 ft/s)

**Typical Industrial Applications**

Chemical industry  
 High sliding velocities  
 Hot media  
 Power plant technology  
 Refining technology

**Performance Capabilities**

Sizes:  $d_1 =$  Upto 100 mm (Upto 4.000")  
 Externally pressurized:  $p_1 = 25$  bar (363 PSI), (higher pressure possible, please inquire)  
 Internally pressurized:  
 $p_1 < 120$  °C (248 °F) 10 bar (145 PSI),  
 $p_1 < 220$  °C (428 °F) 5 bar (72 PSI),  
 $p_1 < 400$  °C (752 °F) 3 bar (44 PSI)  
 Stationary seat lock necessary.  
 Temperature:  $t = -20$  °C ...  $400$  °C (-4 °F ...  $+752$  °F)  
 Speed = 50 m/s (165 ft/s)

Item	Part no.	Description
1.1	472/481	Seal face with bellows unit
1.2	400.1	Flat gasket
2	475	Seat

**DIN 24250**

**Materials**

Bellows: Inconel® 718 (M6), Hastelloy® C-276 (M5)  
 Seal face: Carbon graphite antimony impregnated (A), Silicon carbide (Q12)  
 Seat: Silicon carbide (Q1), Special cast CrMo steel (S)  
 Metal parts: Duplex (G1), Carpenter® 42 (T4), Hastelloy® C-4 (M)

**Dimensional Data**

Dimensions in millimeter

d	d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	d <sub>6</sub>	l	n <sub>x</sub> mx	t
19	16-19	20.5	29	30.3	25.3	45.0	33.5	4xM4	6
24	20-24	25.5	35	38.8	33.8	49.0	33.5	4xM4	6
30	25-30	31.5	40	43.6	38.6	55.0	34.5	6xM4	6
35	31-35	36.0	45	45.8	40.8	59.0	33.0	6xM4	6
40	36-40	41.0	50	51.5	46.5	65.0	30.5	6xM4	6
45	41-45	46.0	55	55.2	50.2	69.0	35.5	6xM4	6
51	46-51	52.0	63	64.7	59.7	76.5	40.5	6xM5	7
60	52-60	61.0	70	70.6	65.6	84.0	32.0	6xM5	7
70	61-70	71.0	80	82.8	76.8	95.0	38.0	6xM5	7
82	71-82	83.5	95	98.0	92.0	112.0	41.0	6xM6	7
88	83-88	89.5	100	107.7	101.7	120.0	47.0	6xM6	7
100	89-100	101.0	112	112.7	106.7	130.0	47.0	6xM6	7

inch size available from size 0.625 to 4.000

Note: Additional technical & dimensional information will be provided on request.

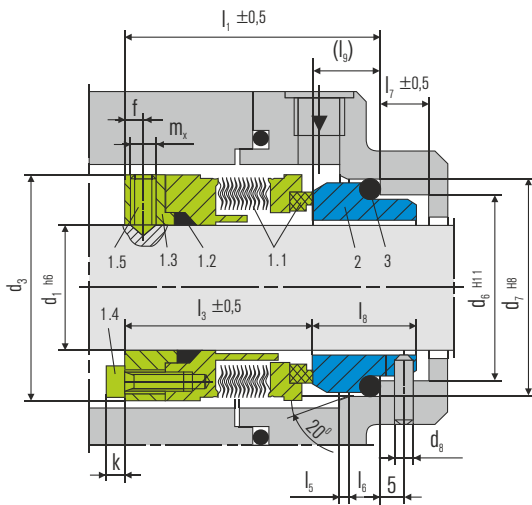


### Product Description

1. Balanced
2. For shafts without a step
3. Independent of direction of rotation
4. Metal bellows rotating
5. Single Seal

### Technical Features

1. For extreme high temperature ranges
2. No dynamically loaded O-Ring
3. Pumping screw for highly viscous media available
4. Self cleaning effect
5. Short installation length possible



### Typical Industrial Applications

Chemical industry      Power plant technology  
 Highly viscous media      Refining technology  
 Hot media

### Materials

Seal face: Carbon graphite antimony impregnated (A), Silicon carbide (Q12)  
 Seat: Silicon carbide (Q1)  
 Bellows: Inconel® 718 hardened (M6),  
 Hastelloy® C-276 (M5)  
 Metal parts: CrNiMo steel (G), Duplex (G1),  
 Carpenter® 42 (T4), Hastelloy® C-4 (M)

### Performance Capabilities

Sizes: d1 = Upto 150 mm (Upto 6.000")  
 Externally pressurized:  
 p1 = ... 25 bar (363 PSI)  
 Internally pressurized:  
 p1 < 120 °C (248 °F) 10 bar (145 PSI)  
 p1 < 220 °C (428 °F) 5 bar (73 PSI)  
 p1 < 400 °C (752 °F) 3 bar (44 PSI)  
 Stationary seat lock necessary  
 Temperature: t = -40 °C .. +400 °C (-148 °F .. +752 °F)  
 Speed = 20 m/s (66 ft/s)

### Design Variations

#### UFL22-19JAA

Shaft diameter: d1 = Upto 150 mm (Upto 6.000")  
 Internally pressurized: p1 = ... 16 bar (232 PSI)  
 Externally pressurized: p1 = 10 bar (145 PSI)  
 Temperature: t = -20 °C ... +400 °C (-4 °F...+752 °F),  
 stationary seat lock necessary.  
 Speed: Vg = 20 m/s (66 ft/s)

Item	Part no.	Description
1.1	472/481	Seal face with bellows unit
1.2	410	Sealing Ring
1.3	474	Drive Collar
1.4		Socket head screw
1.5	904	Set screw
2	475	Seat
3	412	Sealing Ring
<b>DIN 24250</b>		

### Dimensional Data

d1	d3	d6	d7	d8	l1	l3	l5	l6	l7	l8	l9	f	k	mx
16	38	29.0	35.0	3	58.0	46.5	2.0	5	9	19.5	11.5	5	5	M5
18	40	31.0	37.0	3	58.0	46.5	2.0	5	9	19.5	11.5	5	5	M5
20	42	34.0	40.0	3	58.0	46.5	2.0	5	9	19.5	11.5	5	5	M5
22	44	37.0	43.0	3	58.0	46.5	2.0	5	9	19.5	11.5	5	5	M5
24	46	37.0	43.0	3	58.0	46.5	2.0	5	9	19.5	11.5	5	5	M5
25	47	39.0	45.0	3	58.0	46.5	2.0	5	9	19.5	11.5	5	5	M5
28	50	42.0	48.0	3	58.0	46.5	2.0	5	9	19.5	11.5	5	5	M6
30	52	44.0	50.0	3	58.0	46.5	2.0	5	9	19.5	11.5	5	5	M6
32	54	49.0	56.0	4	60.5	46.5	2.0	6	9	22.0	14.0	5	5	M6
33	55	49.0	56.0	4	60.5	46.5	2.0	6	9	22.0	14.0	5	5	M6
35	57	51.0	58.0	4	60.5	46.5	2.0	6	9	22.0	14.0	5	5	M6
38	60	54.0	61.0	4	60.5	46.5	2.0	6	9	22.0	14.0	5	5	M6
40	66	56.0	63.0	4	61.5	47.5	2.0	6	9	22.0	14.0	5	6	M6
43	69	59.0	66.0	4	61.5	47.5	2.0	6	9	22.0	14.0	5	6	M6
45	71	62.0	70.0	4	62.5	47.5	2.5	6	9	23.0	15.0	5	6	M6
48	74	65.0	73.0	4	62.5	47.5	2.5	6	9	23.0	15.0	5	6	M6
50	76	67.0	75.0	4	62.5	47.5	2.5	6	9	23.0	15.0	5	6	M6
53	79	70.0	78.0	4	62.5	47.5	2.5	6	9	23.0	15.0	5	6	M6
55	81	72.0	80.0	4	62.5	47.5	2.5	6	9	23.0	15.0	5	6	M6
58	85	75.0	83.0	4	68.0	53.0	2.5	6	9	23.0	15.0	5	6	M6
60	87	77.0	85.0	4	68.0	53.0	2.5	6	9	23.0	15.0	6	6	M8
63	90	81.0	90.0	4	71.0	53.0	2.5	7	9	26.0	18.0	6	6	M8
65	92	83.0	92.0	4	71.0	53.0	2.5	7	9	26.0	18.0	6	6	M8
68	95	88.0	97.0	4	71.0	53.0	2.5	7	9	26.0	18.0	6	6	M8
70	97	88.0	97.0	4	71.0	53.0	2.5	7	9	26.0	18.0	6	6	M8
75	102	95.0	105.0	4	71.0	52.8	3.0	7	9	26.2	18.2	6	6	M8
80	107	100.0	110.0	4	71.0	52.8	3.0	7	9	26.2	18.2	6	6	M8
85	112	105.0	115.0	4	71.0	52.8	3.0	7	9	26.2	18.2	6	6	M8
90	117	110.0	120.0	4	71.0	53.8	3.0	7	9	25.2	17.2	6	6	M8
95	122	115.0	125.0	4	71.0	53.8	3.0	7	9	25.2	17.2	6	6	M8
100	127	122.2	134.3	5	74.0	54.0	3.0	9	11	30.0	20.0	6	6	M8

inch size available from size 0.625 to 4.000

Note: Additional technical & dimensional information will be provided on request.

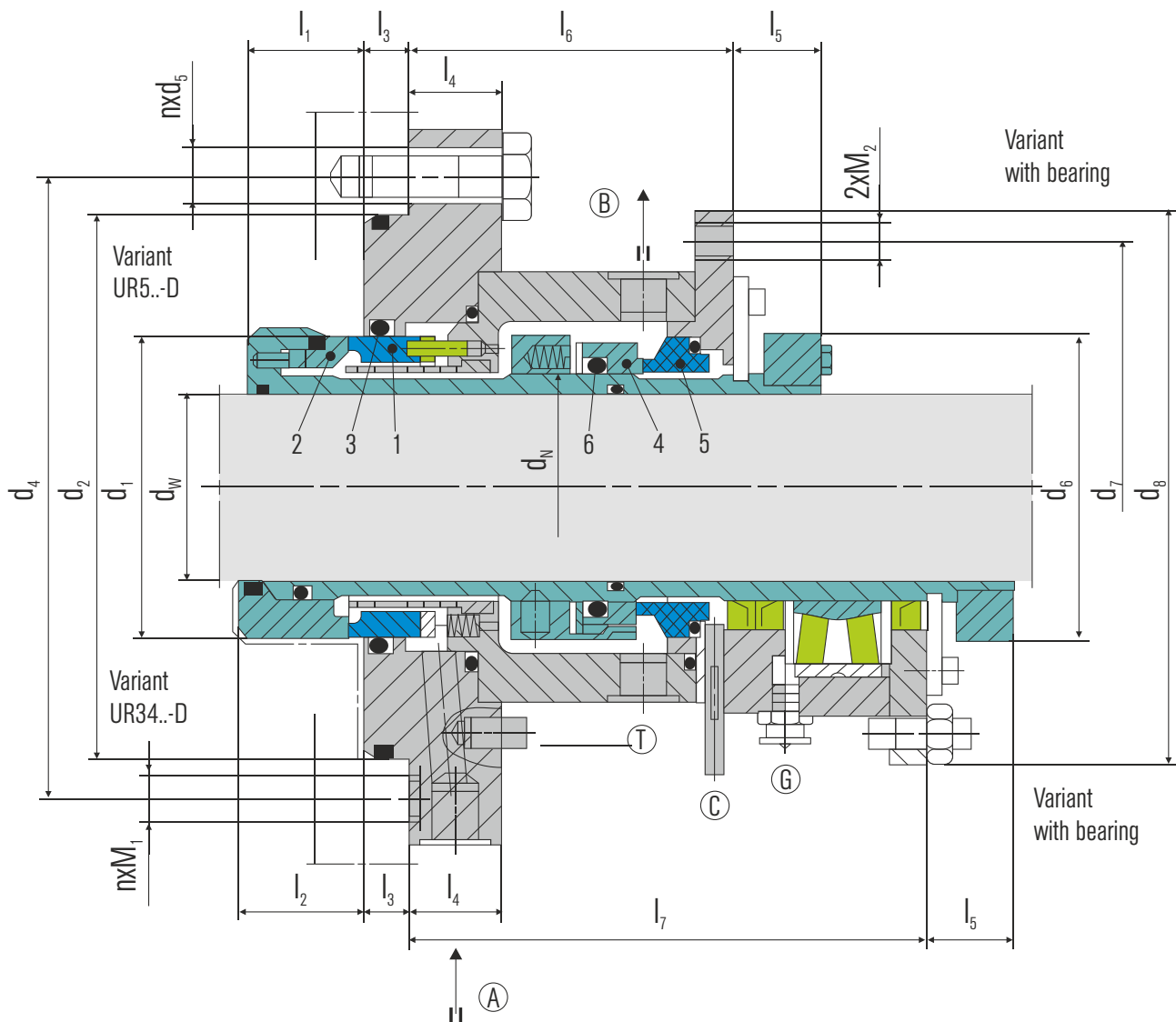


### Product Description

1. Cartridge unit
2. Double seal
3. For top, lateral and bottom drives
4. Independent of direction of rotation
5. Product side seat rotating
6. Unbalanced

### Technical Features

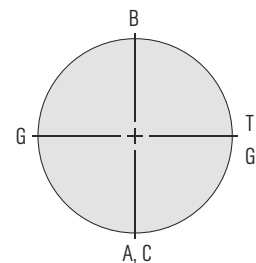
1. CIP-/SIP (Cleaning in Place, Sterilization in Place)
2. Smooth surface with no empty spaces
3. Variant for sterile applications available



Item	Description
1	Seal face, product side
2	Seat, product side
3	O-Ring, dynamic
4	Seal face, atmosphere side
5	Seat, atmosphere side
6	O-Ring, dynamic

Supply Connections	
A	Barrier fluid IN
B	Barrier fluid OUT
C	Drainage
G	Grease
T	Temperature measuring

### Installation, Details, Options



# DIE DICHTUNGS - COMPANY

## Typical Industrial Applications

Chemical industry  
Food and beverage industry  
Pharmaceutical industry  
Dryers

Kneaders  
Mills  
Mixers  
Pressure filters  
Reactors

## Materials

Product side :  
Seal face, seat: Silicon carbide (Q1),  
Tungsten carbide (U)  
Metal parts: Cr steel (E), CrNiMo steel (G),  
Hastelloy® (M)

Atmosphere side:  
Seal face, seat: Silicon carbide (Q1), Carbon  
graphite resin impregnated (B)  
Metal parts: Cr steel (E), CrNiMo steel (G)

Product and atmosphere side:  
Springs: CrNiMo steel (G), Hastelloy® (M)  
Secondary seals: EPDM (E), FKM (V),  
FFKM (K), FKM, FEP wrapped (M5)

Other materials on request.

## Standards

FDA

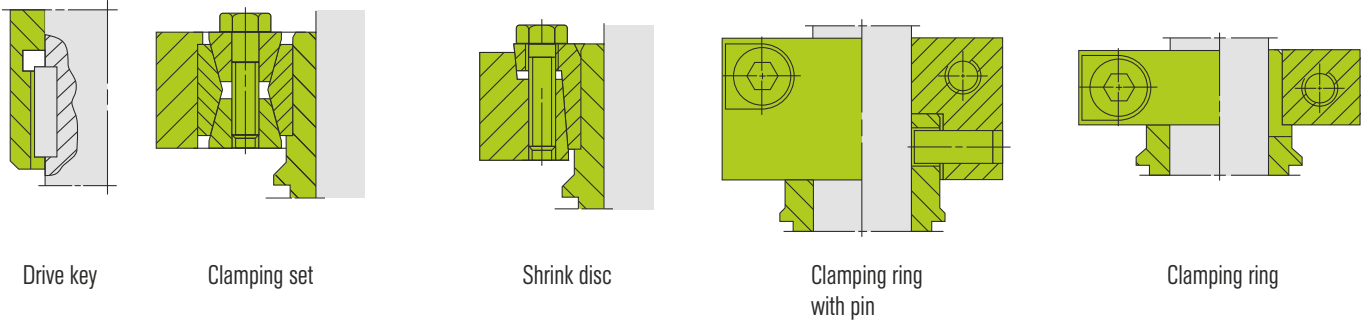
## Notes

Options:  
Cooling or heating flange  
Temperature probe  
Axial expansion joint (shaft lifting)  
Wiper ring (shaft lifting)

## Performance Capabilities

Sizes:  $d_N/d_w =$  Upto 200 (500) mm (Upto 7.875" (20.00"))  
Axial offset shaft/housing:  
 $d_N/d_w 30 \dots 60$  mm (1.18" ... 2.36"): max.  $\pm 1.5$  mm (0.059")  
 $d_N/d_w > 60$  mm (2.36"): max.  $\pm 2.0$  mm (0.079")  
Radial offset shaft/housing: max.  $\pm 0.3$  mm (0.012")  
Pressure:  
 $p_1$  (media) = vacuum ... 14 (23) bar (203 (334 PSI))  
 $p_3$  (buffer fluid) = max. 16 (25) bar (232 (363 PSI))  
 $\Delta p_3 > p_1 =$  min. 2 bar (29 PSI), max. 10 bar (145 PSI)  
Temperature:  
 $t_1$  (media) = -20 °C ... +200 (300) °C (-4 °F ... +392 (572) °F)  
Speed = 20 m/s (66 ft/s)

## Torque Transmissions



## Dimensional Data

### Dimensions in millimeter

$d_N$	$d_w$	$d_1$	$d_2$	$d_3$	$d_4$	$l_1$	$l_2$	$l_3$	$l_4$	$l_5$	$l_6$	$l_7$	A,B	C	nx d6
30	20	52	117	140	118	35	30	114	30	22	75	41	G3/8	G1/8	6X11
35	25	58	124	150	128	35	30	127	30	22	85	41	G3/8	G1/8	6X11
40	30	62	134	165	138	35	30	129	30	24	87	41	G3/8	G1/8	6X11
45	35	68	140	175	148	35	30	130	30	24	87	41	G3/8	G1/8	6X11
50	40	75	145	175	148	35	30	133	34	26	90	41	G3/8	G1/8	8X11
55	45	82.7	150	175	148	35	30	135	34	26	90	41	G3/8	G1/8	8X11
60	50	85	160	185	158	41	30	150	34	30	105	41	G3/8	G1/8	8X11
65	50	90	170	195	168	41	30	160	34	30	105	41	G3/8	G1/8	8X11
70	55	95	175	205	178	41	30	160	34	30	105	41	G3/8	G1/8	8X11
75	60	100	180	205	178	41	30	160	34	30	105	41	G3/8	G1/8	8X11
80	65	110	190	220	188	41	40	190	44	30	105	41	G3/8	G1/8	8X14
85	70	115	195	230	198	41	40	190	44	30	105	41	G3/8	G1/8	8X14
90	75	120	200	230	198	41	40	190	44	30	105	41	G3/8	G1/8	8X14
95	80	127	205	235	203	41	40	190	44	30	105	41	G3/8	G1/8	8X14
100	80	130	210	240	208	41	40	190	44	30	105	45	G3/8	G1/8	8X14
105	85	135	215	250	218	41	40	190	44	30	105	45	G1/2	G1/4	8X14
110	90	140	230	260	228	41	40	190	44	31	110	45	G1/2	G1/4	8X14
115	95	145	235	270	238	41	40	190	44	31	110	45	G1/2	G1/4	8X14
120	100	150	240	270	238	42	40	200	44	31	120	46	G1/2	G1/4	8X14
130	110	160	255	290	258	42	40	200	50	31	120	46	G1/2	G1/4	8X14
140	120	172	265	305	268	43	50	220	50	41	130	46	G1/2	G1/4	8X18
150	130	185	275	315	278	43	50	220	50	41	130	46	G1/2	G1/4	8X18
160	140	195	290	335	298	43	50	220	50	41	130	46	G1/2	G1/4	8X18
170	150	205	300	335	298	47	50	220	50	45	130	46	G1/2	G1/4	8X18
180	160	220	330	355	323	47	50	250	50	45	140	46	G1/2	G1/4	8X18
190	170	230	345	375	358	47	50	250	55	45	140	46	G1/2	G1/4	8X18
200	180	240	365	395	358	47	50	250	55	45	140	51	G1/2	G1/4	8X18
210	190	260	385	415	378	50	50	250	55	45	140	51	G1/2	G1/4	12X18
220	190	270	395	425	388	50	50	250	55	45	140	51	G1/2	G1/4	12X18
230	200	280	395	425	388	50	50	300	55	45	160	51	G1/2	G1/4	12X18

$d_N > 230$  on request

inch size available from size 1.125 to 9.000

Note: Additional technical & dimensional information will be provided on request.

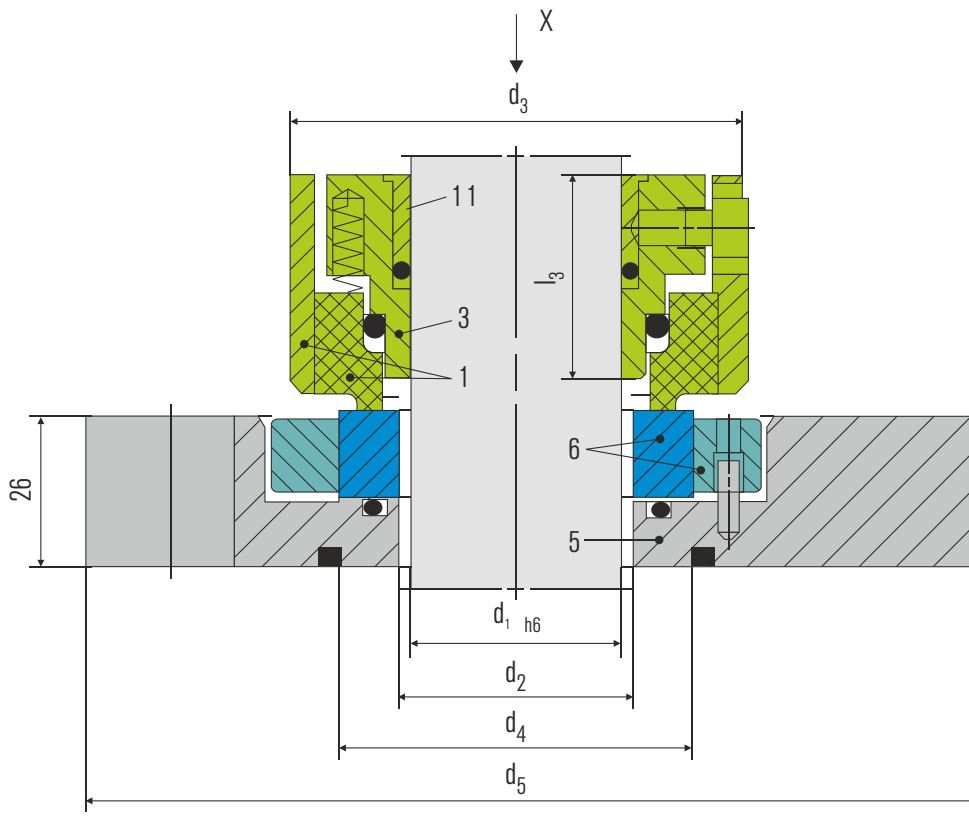


**Product Description**

1. Balanced
2. Dry-running
3. For top entry drives, on request side drive possible
4. Independent of direction of rotation
5. Multiple springs rotating
6. Outboard
7. Single and double seals

**Technical Features**

1. Available as components or as cartridge units
2. Connections for steel (MXSBIE)
3. Glass-lined (MXSBGE) reactors are available to DIN 28138 standards or as required
4. Suitable for pressure reversals



**Typical Industrial Applications**

- Chemical industry
- Food and beverage industry
- Non-toxic media with single seal
- Pharmaceutical industry
- Toxic media with double seal
- Agitators
- Reactors

**Standards**

- FDA
- ATEX
- DIN 28136 T2 (for steel vessels)
- DIN 28141 (flange connection for steel vessels)
- DIN 28154 (shaft end for steel vessels)
- DIN 28136 T3 (for glass-lined vessels)
- DIN 28137 T2 (flange connection for glass-lined vessels)
- DIN 28159 (shaft end for glass-lined vessels)

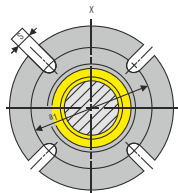
**Materials**

- Seal face: Carbon graphite, FDA conform
- Seat: Silicon carbide
- Secondary seals and metal parts according to application and customer's specifications

**Notes**

- Seat alternatives available on request.
- Options:
  - Cooling or heating flange
  - Flush
  - Polymerization barrier

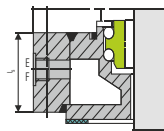
**Installation, Details, Options**



**Seal flange**

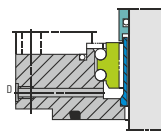
**Option**

Cooling flange, can be used alternatively as a heating flange (tmax. = 350°C (662 °F)).



**Option**

Leakage drain, can be used alternatively as a flush.



**Option**

Polymerization barrier, can be used alternatively as a leakage drain or a flush.

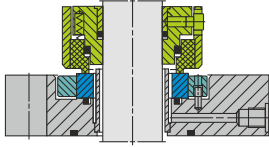
Item	Description
1	Seal face with seal face housing
3	Drive collar
5	Flange
6	Seat with seat housing
11	Clamping

**Performance Capabilities**

- Sizes: d1 = Upto 160 mm (Upto 6.500")
- Pressure: p1 = vacuum ... 6 bar (87 PSI)
- Temperature: t1 = -20 °C ... +150 (250\*) °C (-4 °F ... 302 (482\*) °F)
- Speed = 0 ... 2 m/s (0 ... 6 ft/s)
- Permissible axial movement: ± 1.5 mm
- Radial movement: ± 1.5 mm

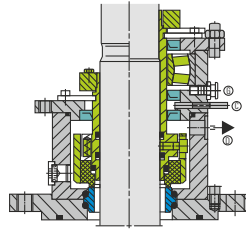


## Design Variations



### MXS-BBA

The MXS-BBA is equipped in addition with a sleeve for trapping any abrasive particles from the seal face. Contamination of the medium in the container is thus ruled out. The sleeve can be cleaned through a flushing bore. Please note: diameters (d2 to d5) increase to the next possible design size.



### Single Seal Variants

#### MXSBIE

Single seal

#### MXSBIE-11

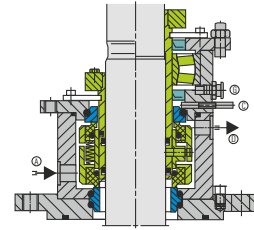
Single seal with integrated floating bearing.

#### MXSBFE

All types of the MXSBIE range available for unstepped shafts (all diameters). Seal identification: MXSBFE ... Customized design or e.g. different drives (torque transmissions) are available.

#### MXSBGE / BJE

For glass-lined vessels. Dimensions as U164



### Double Seal Variants

#### MXSBIE-3

Double seal

#### MXSBIE-11-3

Double seal with integrated floating bearing

These seals are designed to be self-closing on the product side, i.e. they will remain closed even with pressure variations or a pressure reversal. Operation is optionally the same as for the single version. In view of the mechanical seal on the atmosphere side it can be used as a buffer pressurized double seal. The barrier pressure should be 0.5 ... 1.0 bar (7.25 ... 15 PSI) above pressure to be sealed.

## Dimensional Data

Dimensions in millimeter

d <sub>1</sub> (mm)	d <sub>1</sub> (inch)	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	l <sub>2</sub>	l <sub>3</sub>	a <sub>1</sub> (min)	a <sub>1</sub> (max)	s
25	1.000	34	68	-	148	41.5	40.5	100	132	11
28	1.125	34	68	55	148	41.5	40.5	100	132	11
30	-	34	68	55	148	41.5	40.5	100	132	11
32	1.250	39	73	60	153	41.5	40.5	105	137	11
35	1.375	39	73	60	153	41.5	40.5	105	137	11
38	1.500	44	78	65	158	41.5	40.5	110	142	11
40	-	44	78	65	158	41.5	40.5	110	142	11
45	1.625	49	83	68	163	41.5	40.5	115	152	11
-	1.750	49	83	68	163	41.5	40.5	115	152	11
48	1.875	54	88	73	178	41.5	40.5	125	160	14
50	-	54	88	73	178	41.5	40.5	125	160	14
55	2.000	59	93	78	183	41.5	40.5	130	165	14
-	2.125	59	93	78	183	41.5	40.5	130	165	14
60	2.250	64	98	85	188	41.5	40.5	135	170	14
65	2.375	69	103	90	193	44.5	40.5	140	175	14
-	2.500	69	103	90	193	44.5	40.5	140	175	14
70	2.625	74	108	95	198	44.5	43.5	145	180	14
-	2.750	74	108	95	198	44.5	43.5	145	180	14
75	2.875	79	113	100	203	44.5	43.5	150	185	14
80	3.000	84	118	105	208	44.5	43.5	155	190	14
85	3.250	89	123	110	213	44.5	43.5	160	195	14
90	3.500	94	128	115	218	44.5	43.5	165	200	14
95	3.750	99	133	120	223	44.5	43.5	170	205	14
100	-	104	138	125	228	44.5	43.5	175	210	14
105	4.000	109	143	130	233	44.5	43.5	180	215	14
110	4.250	114	148	135	238	44.5	43.5	185	220	14
115	4.500	119	153	140	267	44.5	43.5	196	243	18
125	4.750	129	163	150	277	44.5	43.5	206	253	18
140	5.000	144	178	165	297	44.5	43.5	221	273	18
-	5.250	144	178	165	297	44.5	43.5	221	273	18
-	5.500	144	178	165	297	44.5	43.5	221	273	18
150	5.750	154	188	175	307	44.5	43.5	231	283	18
160	6.000	164	198	185	317	44.5	43.5	241	293	18
-	6.250	164	198	185	317	44.5	43.5	241	293	18

MXSBGE - Dimensions in millimeter

d <sub>3</sub> <sup>1)</sup>	d <sub>7</sub> <sup>1)</sup>	d <sub>1</sub>	n x d <sub>2</sub>	d <sub>4</sub>	d <sub>0</sub>	k	L <sub>1</sub>	L <sub>2</sub>	L <sub>w</sub> <sup>2)</sup>	l <sub>1</sub>	l <sub>2</sub>	A	M <sub>1</sub>	M <sub>1</sub>	A, B
40	38	175	4x18	110	90	145	87	136	143	15	28	122	M12	M16	G3/8
50	48	240	8x18	176	135	210	89	149	148	17	28	157	M12	M16	G3/8
60	58	240	8x18	176	135	210	93.5	156	158	17	28	168	M12	M16	G3/8
80	78	275	8x22	204	155	240	104.5	189	168	20	34	203	M16	M20	G1/2
100	98	305	8x22	234	190	270	109	190	178	20	34	228	M16	M20	G1/2
125	120	330	8x22	260	215	295	110	205	203	20	40	268	M20	M20	G1/2
140	135	395	12x22	313	250	350	124	222	208	20	40	285	M20	M20	G1/2
160	150	395	12x22	313	265	350	127.5	219.5	213	25	40	297	M20	M20	G1/2
180	170	445	12x22	364	310	400	132.5	230	233	25	45	332	M24	M20	G1/2
200	190	445	12x22	364	310	400	137.5	237.5	243	25	45	352	M24	M20	G1/2
220	210	505	16x22	422	340	460	149.5	249.5	263	25	50	381	M24	M20	G1/2

1) Shaft diameters d<sub>3</sub> and d<sub>7</sub> to DIN 28154

2) Shaft step to DIN 28154

inch size available from size 1.500 to 6.500

Note: Additional technical & dimensional information will be provided on request.

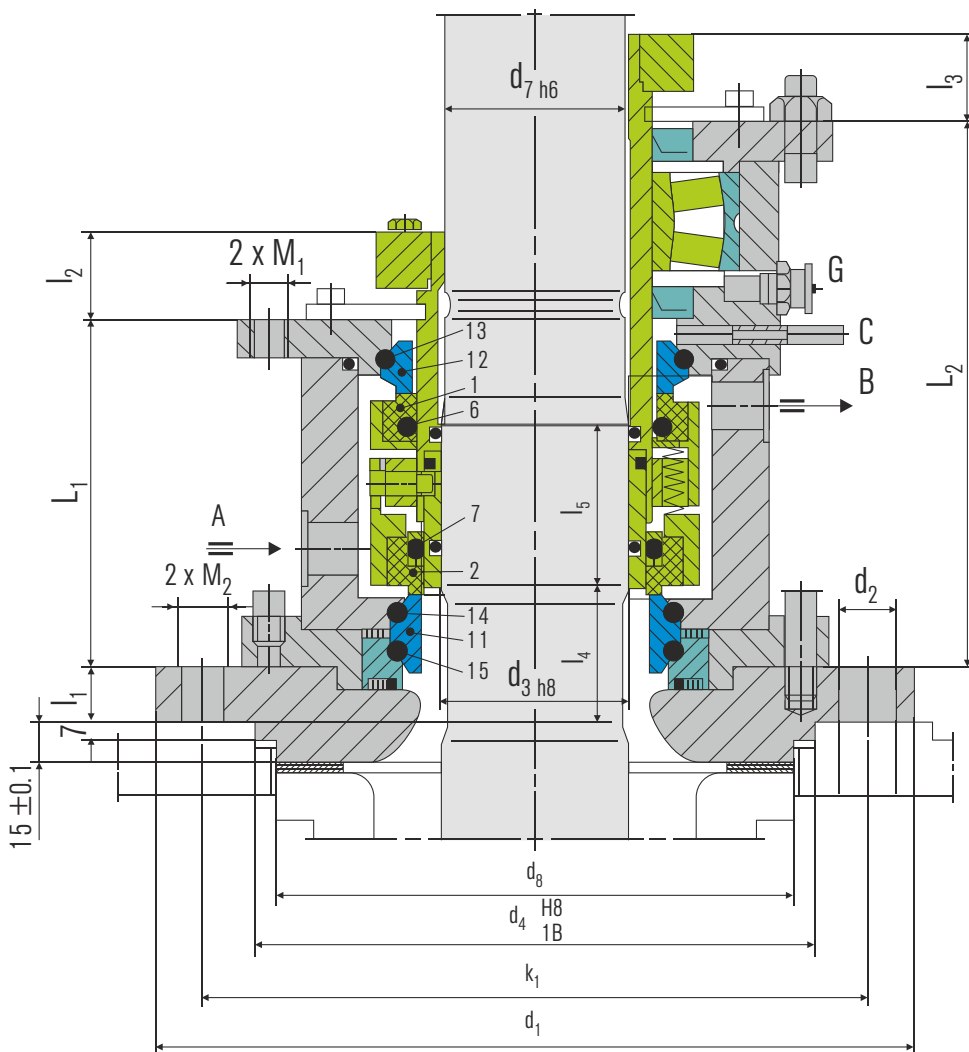


### Product Description

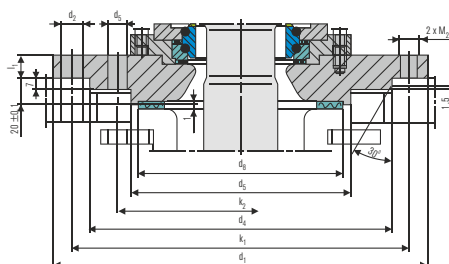
1. Cartridge unit
2. Double seal, single seal on request
3. For glass-lined vessels, acc. to DIN 28138 T2
4. For top entry drives
5. Independent of direction of rotation
6. Multiple springs rotating
7. Unbalanced

### Technical Features

1. Available with or without floating bearing
2. Double seals can be applied at higher pressure and rotating speed
3. Ready-to-fit and factory-tested unit
4. Suitable for standardizations



Item	Description
1	Seal face, atmosphere side
2	Seal face, product side
6, 7, 13	O-Ring
14, 15	O-Ring
11	Seat, product side
12	Seat, atmosphere side



Flange connections acc. to DIN 28137 T2 for nominal diameters 125 ... 161.

### Typical Industrial Applications

Chemical industry  
 Non-toxic media with single seal  
 Pharmaceutical industry  
 Toxic media with double seal  
 Agitators  
 Reactors

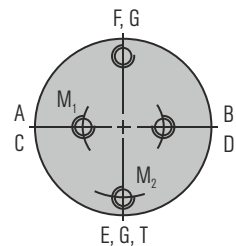
### Materials

According to application and customer's specification.

### Performance Capabilities

Sizes:  $d_3 =$  Upto 160 mm (Upto 6.500")  
 Pressure:  $p_1 =$  vacuum ... 16 bar (232 PSI),  
 $p_3 =$  max. 18 bar (261 PSI)  
 Temperature:  $t_1 = -40$  °C ...  $+200$  (250) °C (-40 °F ...  
 $+392$  (482) °F)  
 Speed = 0 ... 5 m/s (0 ... 16 ft/s)

### Installation, Details, Options

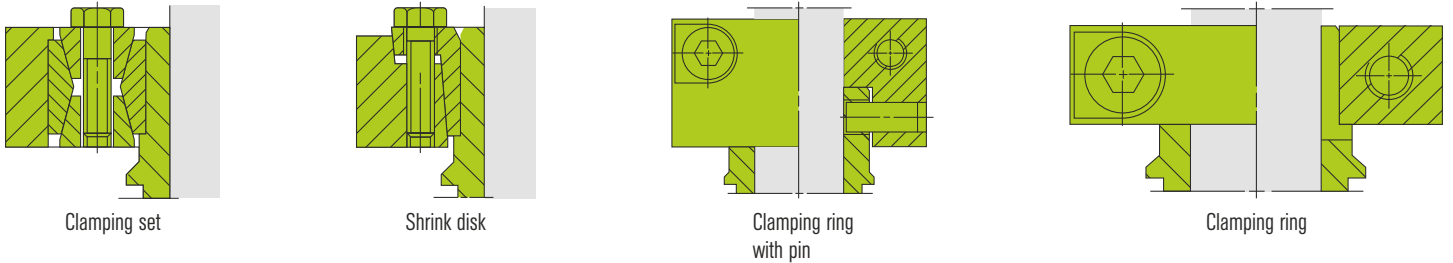


Supply connections  
 Designation and positions of screwed connections, pull-off and jacket threads acc. to DIN 28138 T3.

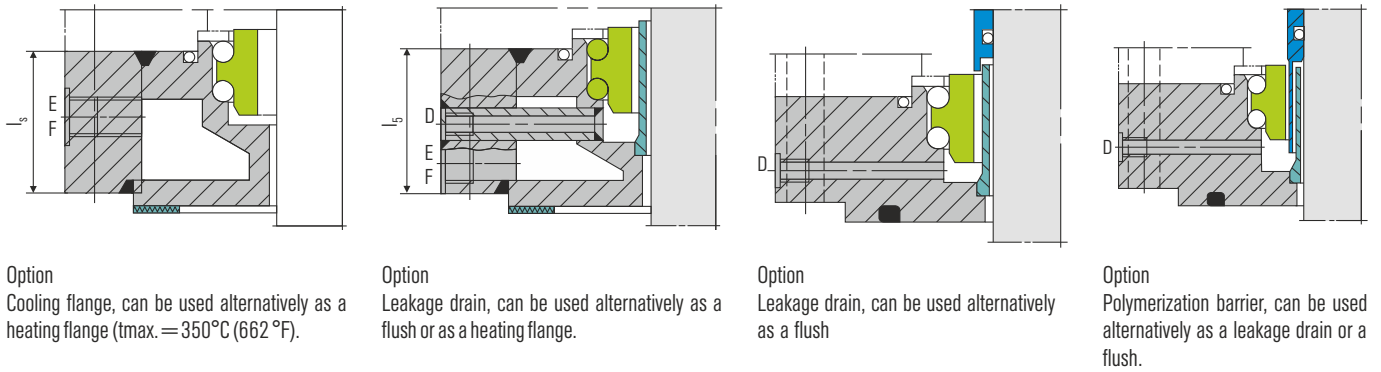
A	Barrier fluid resp. quench IN
B	Barrier fluid resp. quench OUT
C	Drainage
D	Leakage drain G1/8"
E	Cooling IN G3/8"
F	Cooling OUT G3/8"
G	Grease
H	Temperature metering

Standards	Notes
FDA DIN 28136 T3 (for glass-lined vessels) DIN 28137 T2 (flange connection for glasslined vessels) DIN 28159 (shaft end for glass-lined vessels)	Options: Cooling or heating flange Leakage drain, flush or heating flange Leakage drain or flush Polymerization barrier, leakage drain or flush

## Torque Transmissions



## Installation, Details, Options



Option  
Cooling flange, can be used alternatively as a heating flange (tmax. = 350°C (662 °F)).

Option  
Leakage drain, can be used alternatively as a flush or as a heating flange.

Option  
Leakage drain, can be used alternatively as a flush

Option  
Polymerization barrier, can be used alternatively as a leakage drain or a flush.

## Design Variations

Double Seals Variants
<b>U164K-D</b> Double seal
<b>U164KL-D</b> Double seal with integrated floating bearing
<b>U156K(L)-D</b> Double seal with/without floating bearing for PN25

## Dimensional Data

Dimensions in millimeter

d <sub>3</sub> <sup>1)</sup>	d <sub>7</sub> <sup>1)</sup>	Nominal size	Flange size <sup>2)</sup>	d <sub>1</sub>	nxd <sup>2</sup>	d <sub>4</sub>	nxd <sub>5</sub>	d <sub>6</sub>	d <sub>7</sub>	[k <sub>1</sub> ]	[k <sub>2</sub> ]	L <sub>1</sub>	L <sub>2</sub>	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>5</sub>	M <sub>1</sub>	M <sub>2</sub>	A,B
40	38	40	E125	175	4X18	110	-	-	102	145	-	142	184	25	35	28	50	50	M12	M16	G3/8
50	48	50	E200	240	8X18	176	-	-	138	210	-	147	195	25	40	28	50	50	M12	M16	G3/8
60	58	60	E250	275	8X22	204	-	-	188	240	-	158	203	30	42	28	50	60	M12	M20	G3/8
80	78	80	E300	305	8X22	234	-	-	212	270	-	170	240	30	45	34	60	60	M16	M20	G1/2
100	98	100	E400	395	12X22	313	-	-	268	350	-	177	240	30	52	34	60	60	M16	M20	G1/2
100	98	100	E500	395	12X22	313	-	-	268	350	-	177	240	30	52	34	60	60	M16	M20	G1/2
125	120	125	E700	505	4X22	422	12X22	320	306	460	350	208	266	30	75	40	60	80	M20	M20	G1/2
140	135	140	E700	505	4X22	422	12X22	320	306	460	350	223	282	30	79	40	60	80	M20	M20	G1/2
160	150	160	E700	505	4X22	422	12X22	320	306	460	350	228	282	30	77	40	60	85	M20	M20	G1/2
160	150	160	E900	505	4X22	422	12X22	320	306	460	350	228	282	30	77	40	60	85	M20	M20	G1/2
160	150	161	E901	565	4X26	474	12X22	370	356	515	400	228	282	30	77	40	60	85	M20	M20	G1/2

1) Shaft diameters d<sub>3</sub> and d<sub>7</sub> to DIN 28159

2) Flange size to DIN 28137T2

inch size available from size 1.575 to 6.500

Note: Additional technical & dimensional information will be provided on request.

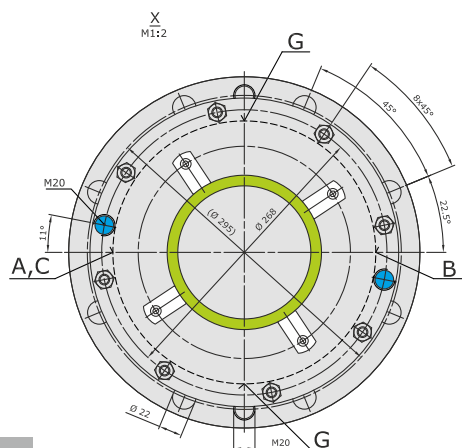
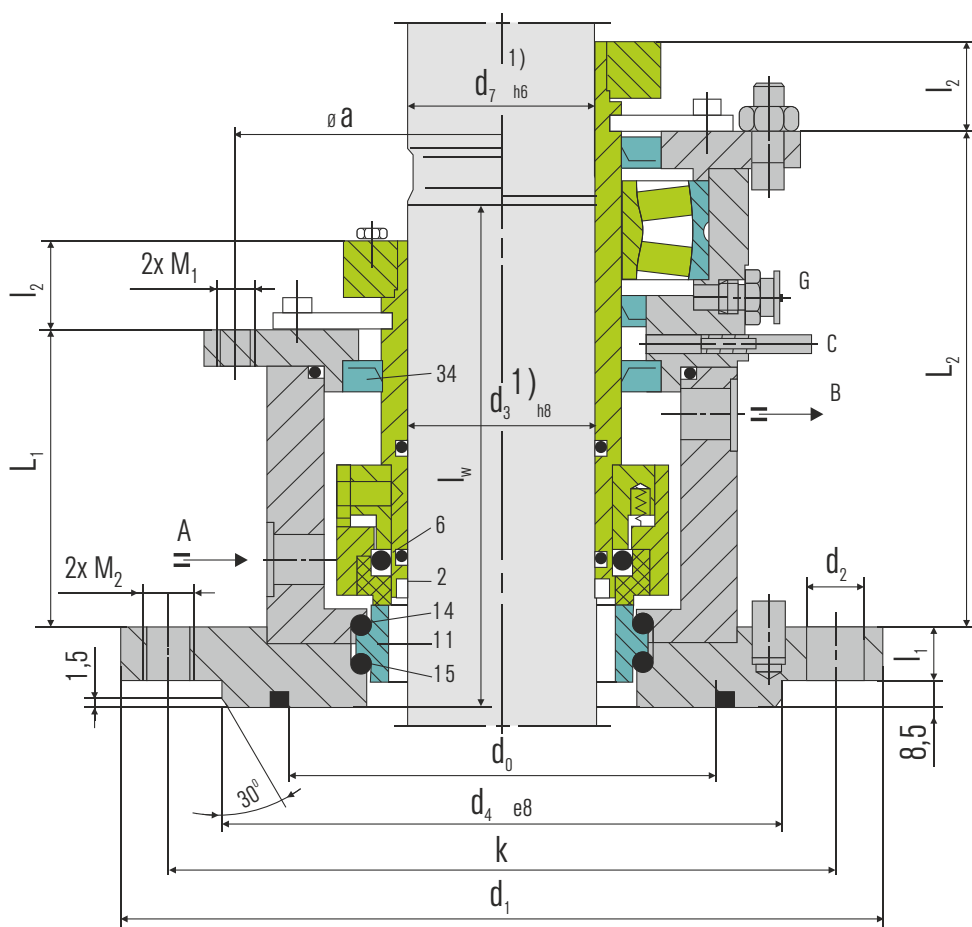


### Product Description

1. Cartridge unit
2. For top entry drives, type BIE to DIN
3. Independent of direction of rotation
4. Liquid-lubricated
5. Multiple springs rotating
6. Single or double seals
7. Unbalanced

### Technical Features

1. Available with or without floating bearing
2. Double seals can be applied at higher pressure
3. Ready-to-fit and factory-tested units
4. Suitable for standardizations



### Typical Industrial Applications

Agitators  
 Chemical industry  
 Non-toxic media with single seal  
 Pharmaceutical industry  
 Reactors  
 Toxic media with double seal

### Performance Capabilities

DIN 281 38 T2  
 Sizes:  $d_3$  = Upto 220 mm (Upto 8.625")  
 Single seals:  
 Pressure:  $p_1$  = vacuum ... 6 bar (87 PSI),  
 $p_3$  = pressureless  
 Temperature:  $t_1^*$  = -40 °C ... +150 (250) °C  
 (-40 °F ... +302 (482) °F)  
 Double seals:  
 Pressure:  $p_1$  = vacuum ... 16 bar (232 PSI),  
 $p_3$  = max. 18 bar (261 PSI)  
 Temperature:  $t_1^*$  = -40 °C ... +200 (350) °C  
 (-40 °F ... +392 (662) °F)  
 Speed = 0 ... 5 m/s (0 ... 16 ft/s)

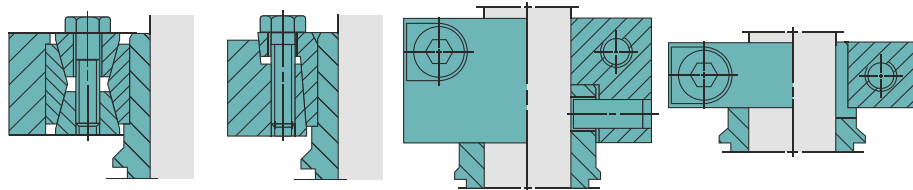
### Standards

FDA  
 DIN 28136 T2 (for steel vessels)  
 DIN 28141 (flange connection for steel vessels)  
 DIN 28154 (shaft end for steel vessels)

### Notes

Options:  
 Cooling or heating flange  
 Leakage drain, flush or heating flange  
 Leakage drain or flush  
 Polymerization barrier, leakage drain or flush

### Torque Transmissions



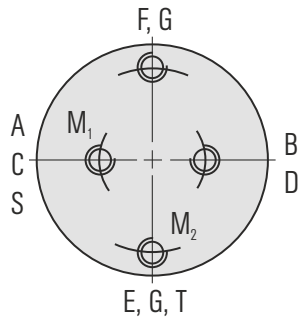
Clamping set

Shrink disk

Clamping ring with pin

Clamping ring

## Installation, Details, Options

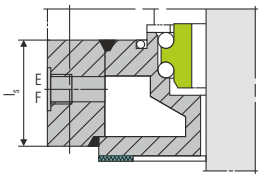


Supply connections

Designation and position acc. to DIN 28138 T3.

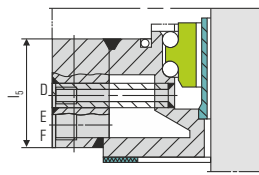
A	Barrier fluid resp. quench IN
B	Barrier fluid resp. quench OUT
C	Drainage
D	Leakage drain G1/8"
E	Cooling IN G3/8"
F	Cooling OUT G3/8"
G	Grease
S	Flush
T	Temperature metering

For reasons of standardization, the supply connections of single seals are matched to those of the double seals (in deviation from DIN 28138 T3).



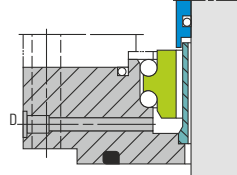
### Option

Cooling flange, can be used alternatively as a heating flange (tmax. = 350°C (662°F)).



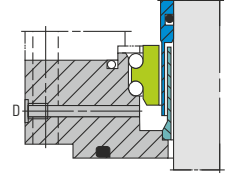
### Option

Leakage drain, can be used alternatively as a flush or as a heating flange.



### Option

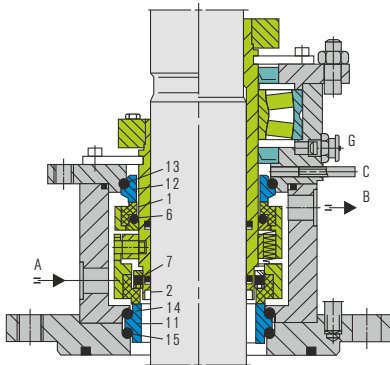
Leakage drain, can be used alternatively as a flush.



### Option

Polymerization barrier, can be used alternatively as a leakage drain or a flush.

## Design Variations



### U154

All types of the BIE range available for unstepped shafts (all diameters). Seal identification: BFE...  
Customized design or e.g. different drives (torque transmissions) are available.

### Single Seals Variants

#### BIEK

Single seal

#### BIEKL

Single seal with integrated floating bearing.  
Operation of single seals only with pressure less quench.

### Double Seals Variants

#### BIEK-D

Double seal

#### BIEKL-D

Double seal with integrated floating bearing.  
These seals are designed to be self-closing on the product side, i.e. they will remain closed even with pressure variations or a pressure reversal. Operation is optionally the same as for the single version (pmax = 6 bar (87 PSI) or Δpmax = 6 bar at p1 > p3).  
In view of the mechanical seal on the atmosphere side it can be used as a buffer pressurized double seal (p = 16 bar (232 PSI)).

## Dimensional Data

### Dimensions in millimeter

d <sub>3</sub> <sup>1)</sup>	d <sub>7</sub> <sup>1)</sup>	d <sub>1</sub>	n x d <sub>2</sub>	d <sub>4</sub>	d <sub>0</sub>	k	L <sub>1</sub>	L <sub>2</sub>	L <sub>w</sub> <sup>2)</sup>	l <sub>1</sub>	l <sub>2</sub>	A	M <sub>1</sub>	M <sub>2</sub>	A, B
40	38	175	4X18	110	90	145	87	136	143	15	28	122	M12	M16	G3/8
50	48	240	8X18	176	135	210	89	149	148	17	28	157	M12	M16	G3/8
60	58	240	8X18	176	135	210	93.5	156	158	17	28	168	M12	M16	G3/8
80	78	275	8X22	204	155	240	104.5	189	168	20	34	203	M16	M20	G1/2
100	98	305	8X22	234	190	270	109	190	178	20	34	228	M16	M20	G1/2
125	120	330	8X22	260	215	295	110	205	203	20	40	268	M20	M20	G1/2
140	135	395	12X22	313	250	350	124	222	208	20	40	285	M20	M20	G1/2
160	150	395	12X22	313	265	350	127.5	219.5	213	25	40	297	M20	M20	G1/2
180	170	445	12X22	364	310	400	132.5	230	233	25	45	332	M24	M20	G1/2
200	190	445	12X22	364	310	400	137.5	237.5	243	25	45	352	M24	M20	G1/2
220	210	505	16X22	422	340	460	149.5	249.5	263	25	50	381	M24	M20	G1/2

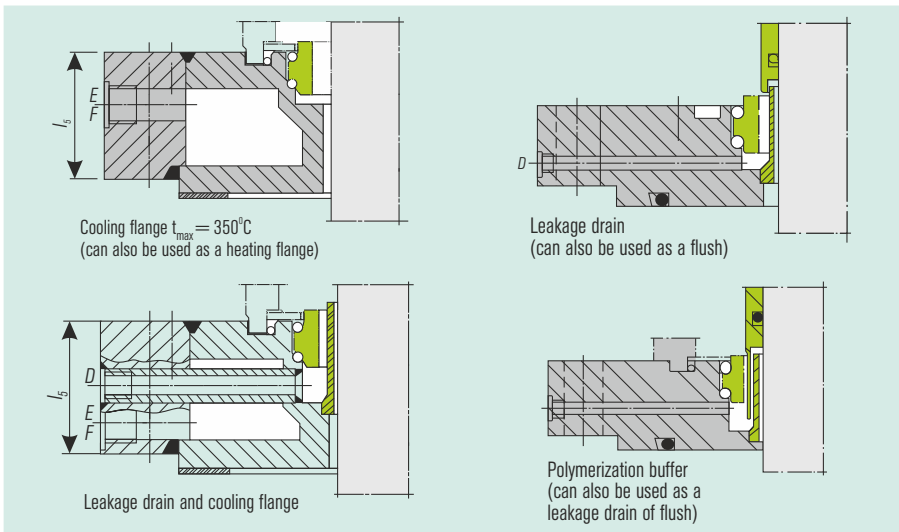
1) Shaft diameters d<sub>3</sub> and d<sub>7</sub> to DIN 28154

2) Shaft step to DIN 28154

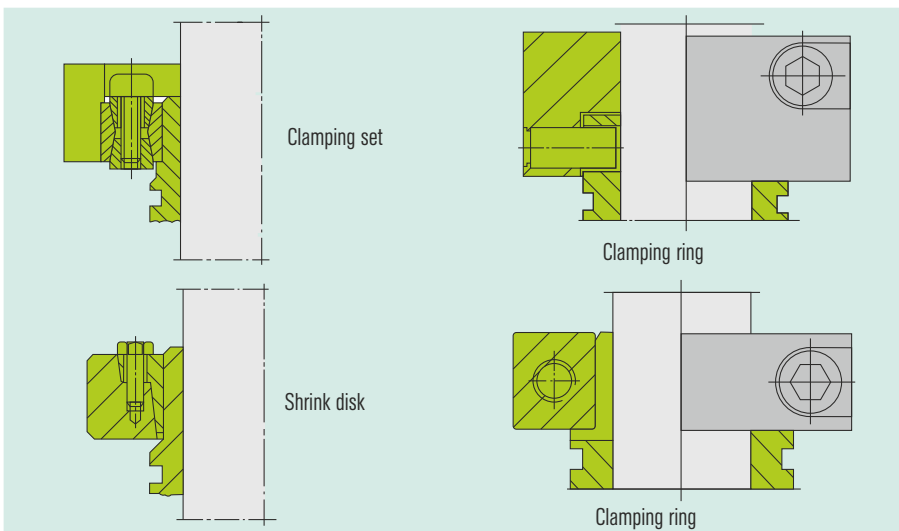
inch size available from size 1.500 to 8.625

Note: Additional technical & dimensional information will be provided on request.

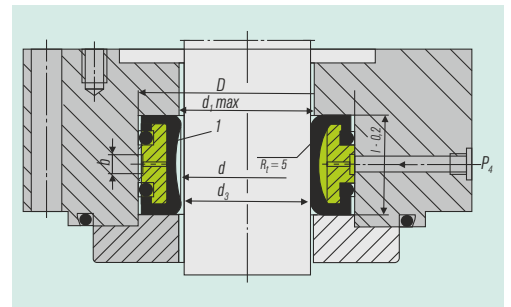
## Additional Options



## Types Of Drive



## Shut-Down Seal (Vessel Containment)

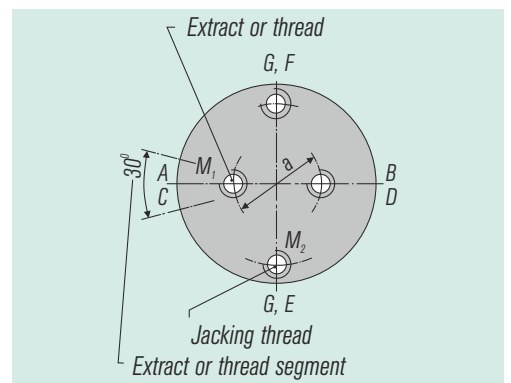


### STD1

If an STD is employed, it is possible to change seals with the vessel loaded and under pressure (shaft must be stationary!) This seal is only used if the product does not harden or congeal during the shut down period. It cannot be used if PTFE is required or for sterile operation (fermenting vessels). Can be installed in all aspects. Fitting dimensions in accordance with DIN 281 38 Part 1 are possible.

Operating limits	$d_3$	D	d	$d_1$	l	b
$d_w = 40.. 200 \text{ mm}$	40	76	42.5	42	38.0	8
16" .. 8"	50	84	52.5	52	38.0	8
$p_1 = 1.6 \text{ bar } 232 \text{ PSI}$	60	95	62.5	62	44.5	10
$t = 100^{\circ}\text{C } 212^{\circ}\text{F}$	60	118	82.5	82	45.0	10
Elastomer sealing element (Item no. 1) with pneumatic or hydraulic actuation (closing pressure $P_4 > P_1$ ).	100	138	102.5	102	45.0	10
	125	160	127.5	127	45.0	10
	140	180	143.5	143	50.0	12
	160	200	163.5	163	50.0	12
	180	215	183.5	183	50.0	12
	200	240	203.5	203	50.0	12

## Screwed Connections



Designation and position in accordance with DIN 281 38 T3.

- A = Buffer fluid resp. quench IN
- B = Buffer fluid resp. quench OUT
- C = Drainage
- D = Leakage drain G<sup>1</sup>/8
- E = Coolant IN G<sup>3</sup>/8
- F = Coolant OUT G<sup>3</sup>/8
- G = Grease point

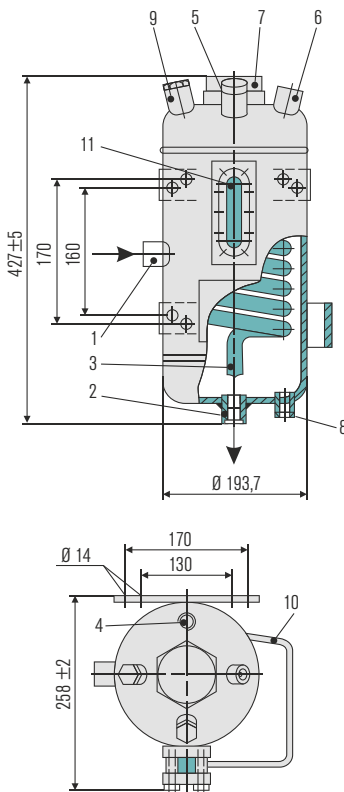


### Product Description

1. **ADE2000** thermosiphon system makes it possible to supply buffer/barrier fluid to a double and a tandem mechanical seal for a broad range of applications.
2. The range is available in different pressure levels with dished heads, sight-glass for level monitoring and with or without cooling coil.
3. **ADE** vessels are equipped as standard with all the necessary system connections and brackets.
4. The modular system allows the **ADE 2000** vessels to be combined with a wide range of system components such as, level switch, circulation pump, hand refill pump, thermometer, base frame, etc.
5. Circulation in accordance with API 682/ISO 21.

### Technical Features

1. Available with or without cooling coil.
2. Cooling water connections at top (OUT) and bottom (IN): optimum draining and venting.
3. Sockets with recessed gasket : no contamination of the circuit by thread sealant.
4. Suitable for a wide range of demanding operating conditions: ADE 2000 up to 30 bar / 200°C.
5. Vessel made of 31 6 stainless steel / borosilicate sight-glasses: suitable for universal applications.



Item	Description
1	Buffer/barrier fluid IN (G1/2")
2	Buffer/Barrier fluid OUT (G1/2")
3	Cooling water IN (G1/2")
4	Cooling water OUT (G1/2")
5	Filling connection with plug (G1/2")
6	Pressure gas connection (G1/2")
7	Connection for level switch or level indicator (G2")
8	Connection for refill unit (G1/8")
9	Universal connection (G1/2" for safety valve, flare, etc.)
10	Bracket for refill unit
11	Sight-glass

### Typical Industrial Applications

Chemical industry  
Oil and gas industry  
Petrochemical industry  
Refining technology

### Standards

PED 97/23 EC (Design and production in accordance with EU Pressure Equipment Directive)  
ASME VIII, Div. 1 (Design, calculation and production)

### Functional Description

The **ADE** system performs all the basic functions of a buffer/barrier system for the operation of double seals:

- to pressurize the buffer chamber
- leakage compensation
- buffer/barrier fluid is circulated by thermosiphon effect or external circulation system
- to cool the seal
- to selectively absorb product leakage and prevent dry running (tandem arrangement)
- Use compressed air or nitrogen for pressurization.
- Circulation in accordance with API 682 / ISO 21 049: Plan 52, Plan 53A

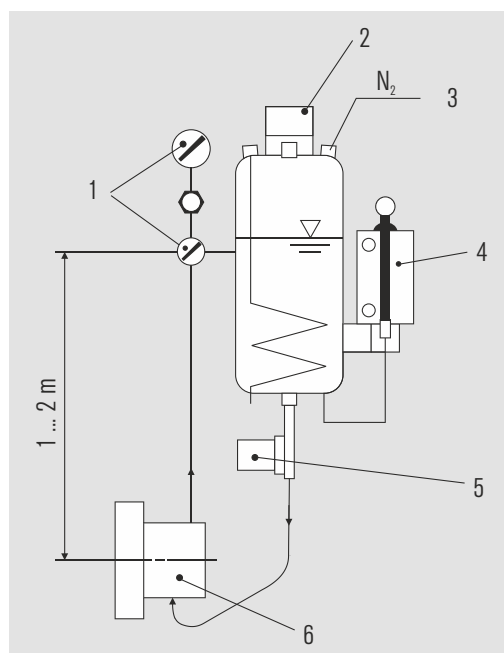
### Technical Features

Designation	ADE2000
Pressure Equipment Directive	PED
Integrated cooling coil	Yes
Volume, vessel (liters)	9
Volume, tube (liters)	0.5
Allowable pressure <sup>1)</sup>	30 bar (435 PSI)
Allowable temperature <sup>1)</sup>	-60 ... +200 °C (-76 ... +392 °F)
Working volume, MAX-MIN (liters)	1.8
Cooling capacity - without cooling water (kW) <sup>3)</sup>	0.5

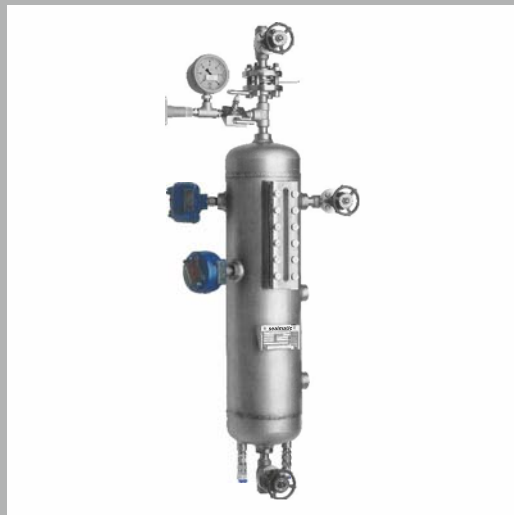
- 1) Higher values on request
- 2) Other materials on request

### Operating and Installation Schematic

The **ADE** vessel must always be installed higher than the mechanical seal. The buffer/barrier fluid flows via the return pipe into the vessel and is cooled. The exchange of fluid takes place by the thermosiphon principle or by forced circulation, e.g. with a pumping screw. Connection pipes to the seal should be designed with as little resistance as possible.



1. Measuring unit
2. Level Switch
3. From PCV, we recommend using a reverse controlled pressure control valve (PCV)
4. Hand Refill Pump
5. Circulating Pump
6. Mechanical seal

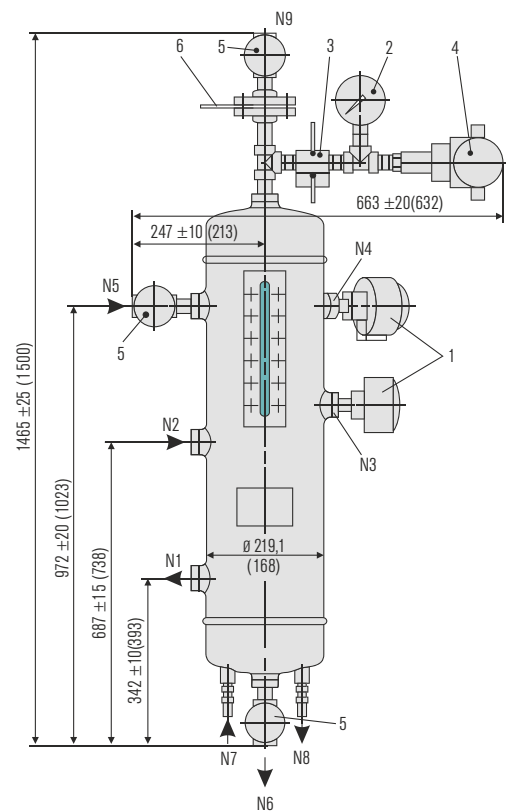


### Product Description

The ADE Thermosiphon systems of the ADE6000 range meet all the requirements to supply mechanical seals in accordance with the API 682 guidelines. The vessels are equipped with all essential connections for fitting additional components. The range is available in two standard vessel sizes (shown: ADE6000) with dished heads; a version which can be dismantled is also available as an option. The modular system allows the ADE6000 vessels to be combined with a wide range of system components such as, level switch/transmitter, pressure switch/transmitter, base frame, etc. Circulation in accordance with API 682 / ISO 21049: Plan 52, Plan 53A

### Technical Features

1. A version which can be dismantled is also available as an option: for optimum and simple cleaning of the vessel interior
2. Modular system: combination with a wide range of system components possible
3. Operating limits up to 50 bar / 200°C: suitable for a wide range of demanding operating conditions
4. Robust design with weld-pad type sight-glass for optimum visual level monitoring



### Typical Industrial Applications

Refining technology  
Oil and gas industry  
Chemical industry  
Petrochemical industry

### Standards

PED 97/23 EC  
ASME VIII, Div. 1

### Thermosiphon System (API Plan 52)

Item	Description
1	Level switch
2	Manometer
3	Manifold
4	Pressure switch
5	Shut-off valve
6	Orifice

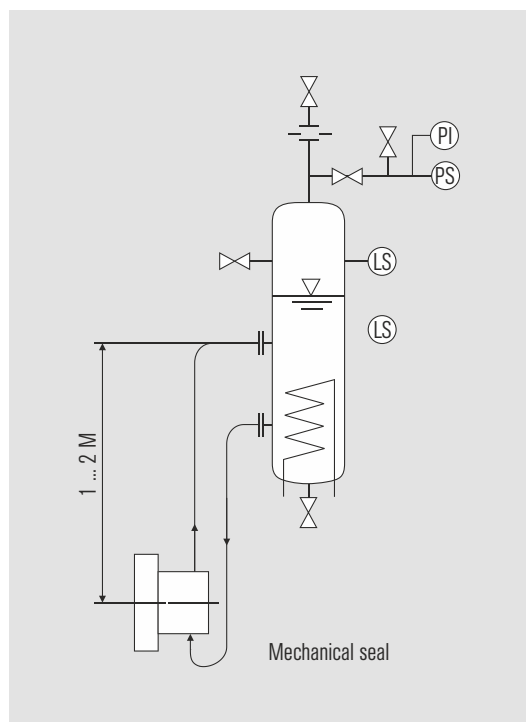
### Functional Description

The ADE system performs all the basic functions of a buffer/barrier system for the operation of double seals:

- to pressurize the buffer chamber
- leakage compensation
- buffer/barrier fluid is circulated by thermosiphon effect or forced circulation system
- to cool the seal
- to selectively absorb product leakage and prevent dry running (tandem arrangement)

Use compressed air or nitrogen for pressurization; pressurization is monitored by a pressure switch. The incorporated level switch issues a signal whenever the level of buffer/barrier fluid is too low.

### Installation, Details, Options



### Operating and installation diagram for a ADE6000 system.

The ADE vessel must always be installed higher than the mechanical seal. The buffer/barrier fluid flows via the return pipe into the vessel and is cooled. The exchange of fluid takes place by the thermosiphon principle or by forced circulation, e.g. with a pumping screw. Connection pipes to the seal should be designed with as little resistance as possible.

### Thermosiphon System (API Plan 52)

Item	Description
N1	to the mechanical seal
N2	from the mechanical seal
N3	Level switch
N4	Level switch
N5	Filling connection
<b>Bottom</b>	
N6	Drain
N7	Cooling water IN
N8	Cooling water OUT
<b>Cover</b>	
N9	Connection to flare

Dimensions for ADE6002 / ADE6003 values in brackets for ADE6000 / ADE6001





### Product Description

Pressurized barrier system (closed circuit) for use in seal systems with high pressures and/or for hazardous/environmentally harmful processes. The ADE (Plan 53B) range is available with a pressure accumulator, cooler (finned tube, water or air cooler with fan) and a wide range of instruments.

Circulation in accordance with API 682 / ISO 21 049: Plan 53B

### Technical Features

1. Available with finned tube, water or air coolers with fan.
2. Barrier pressure is created without any need for connection to a nitrogen supply.
3. Modular system: combination with a wide range of system components/instruments possible.
4. Pressurization is by means of a pre-loaded bladder accumulator.
5. The nitrogen is separated from the barrier medium by membranes in the accumulator: nitrogen cannot get into the barrier medium or process medium.

### Typical Industrial Applications

Chemical industry  
Oil and gas industry  
Petrochemical industry  
Refining technology

### Functional Description

The ADE is designed to perform the following functions of a barrier system:

- to pressurize the barrier chamber
- leakage compensation
- to cool the seal

Pressurization ( $>$  process pressure) prevents the process medium from getting into the barrier circuit or the atmosphere. Pressurization is supplied by a pressure accumulator which is pre-loaded with nitrogen. Circulation in the barrier circuit takes place by the thermosiphon principle or by forced circulation, e.g. with a pumping screw.

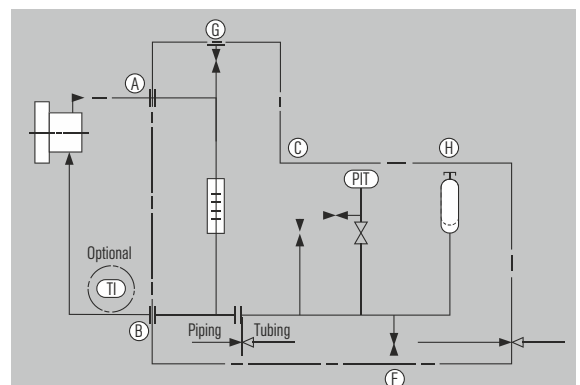
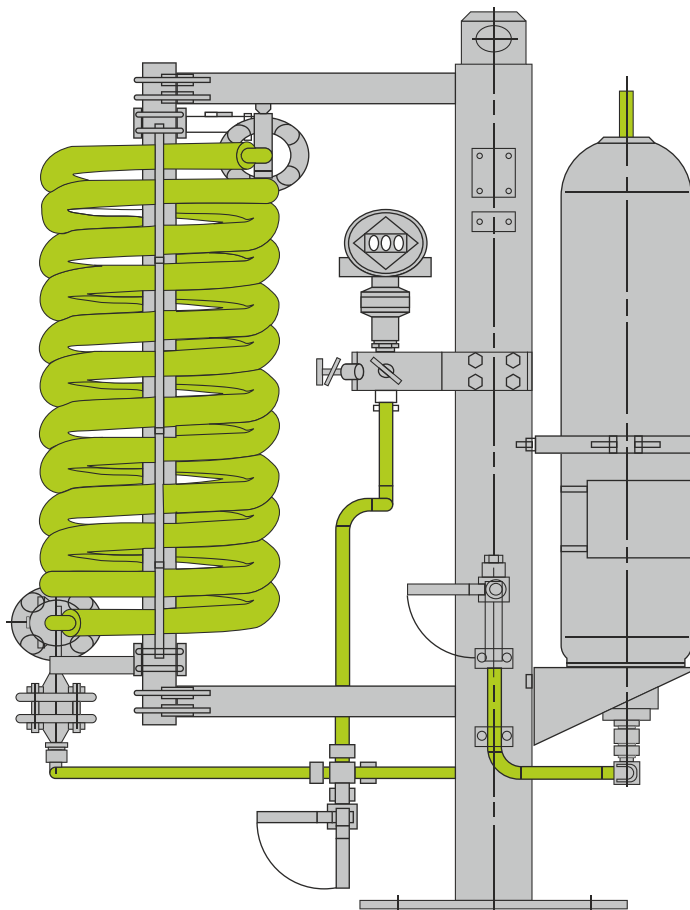
### Standards

PED 97/23 EC (Design and production in accordance with EU Pressure Equipment Directive)  
ASME VIII, Div. 1 (Design, calculation and production)

### Installation, Details, Options

#### Operating and installation diagram for a ADE (Plan 53B).

- A From mechanical seal
- B To mechanical seal
- C Fill
- F Drain
- G Vent
- H N<sub>2</sub> Precharge





### Features

Barrier pressure units of the ADE range perform all the functions of a barrier system essential for operating double seals (circulation and cooling of the barrier medium, pressurization of the barrier fluid and compensation of leakage). The ADE range is available in 3 basic versions: ADE1000: tank capacity 40 l, flow rate 6 l/min. ADE2000: tank capacity 100 l, flow rate 12 l/min. ADE3000: tank capacity 100 l, flow rate 23 l/min. The three ADE ranges are designed for hydraulic oil with viscosity values of 12 to 90 mm<sup>2</sup>/s at operating temperature (tank temperature). The optimum viscosity of the class of the oil to be used has to be determined separately in accordance with the respective application.

### Advantages

1. Automatic relief valve for reducing barrier fluid pressure at standstill
2. Barrier fluid directed through oil cooler  
Reversible double filter (ADE1000: single filter)
3. Level switch with contact for MIN level
4. Manual control of barrier fluid pressure
5. Measuring instrument connections suitable for fitting contact switching devices (NG160)
6. Max. operating temperature in the tank 80°C (return line max. 90°C)
7. Provision of an additional pressure connection for monitoring the pump discharge pressure (outside the circuit)
8. Temperature monitoring with a return line and tank thermometer

### Typical Industrial Applications

Chemical industry  
Oil and gas industry  
Petrochemical industry  
Refining technology

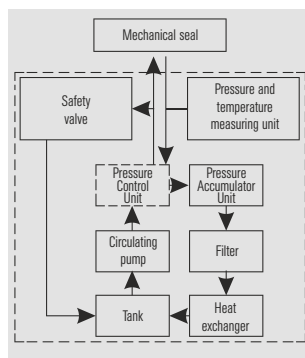
### Functional Description

The barrier pressure for circulation is generated by a gear pump. The setpoint barrier pressure is set on an overflow valve in the mechanical seal return line. From this point on the barrier fluid flows back without pressure through a filter and a heat exchanger to the storage tank. To enable systems (pump, agitator) to be stopped without causing damage to the seal in the event of a malfunction (e.g. power failure, damaged motor, etc.), the barrier pressure unit can be fitted with a pressure accumulator unit. To prevent the pressure in the accumulator discharging to the pressureless storage tank, the return line has a pilot-operated check valve, and the supply line also has a simple check valve. The barrier pressure is retained for a limited time. However, no circulation takes place and no heat is dissipated from the mechanical seal.

### Product Variants

Version, Designation	Nominal pressure max. Barrier pressure	Flow rate (l/min)	Cooling capacity (kW) with hydraulic oil $\Delta t = 10K$	Tank		Dimensions overall (mm)			Net weight approx.	Motor data
				Nominal capacity (liters)	Circulation volume (liters)	Height	Width	Depth		
ADE 1040	40 bar (580 PSI)	6	1.8	40	12	650	610	380	125	1
ADE 1090	90 bar (1,305 PSI)	6	1.8	40	12	650	610	380	125	2
ADE 2050	50 bar (725 PSI)	12	3.6	100	20	750	800	555	140	2
ADE 2120	120 bar (1,740 PSI)	12	3.6	100	20	750	800	555	140	3.6
ADE 3120	120 bar (1,740 PSI)	23	6.9	100	20	750	800	555	140	6.8

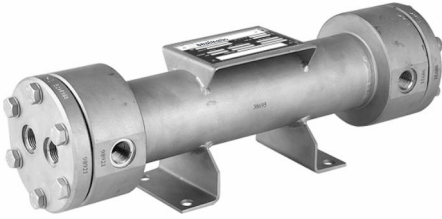
### Installation, Details, Options



Installation and operating diagram for a ADE system.

### ADE4000 versions

for water and other media available as an option.



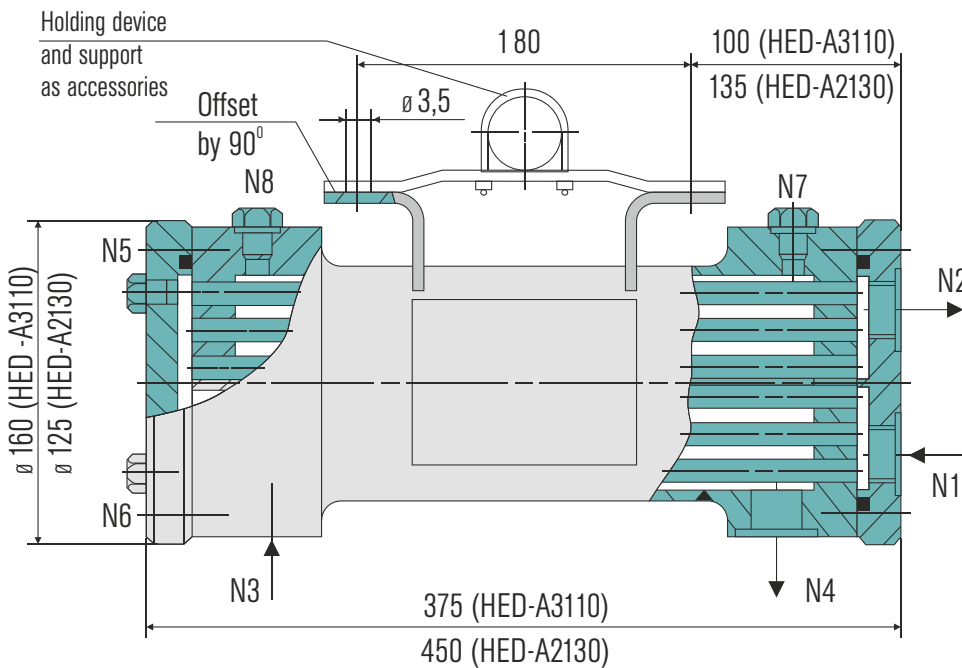
### Product Description

Heat exchangers of the HED-A range are used to cool process/barrier fluids in seal supply circuits. Designed as a tubular heat exchanger with integrated guide plates, the process/barrier medium is directed through the shell of the HED-A and the cooling medium through the tubes.

Circulation in accordance with API 682 / ISO 21049: Plan 21, Plan 22, Plan 23, Plan 41

### Technical Features

1. Cooling capacity up to 36 kW\*
2. It can be installed either in vertical or horizontal position
3. The heat exchanger can be dismantled: easy to clean
4. Tubular heat exchanger design with integrated guide plates, extremely efficient cooling capacity yet very compact dimensions
5. Universal usage: parts in contact with the medium are made of stainless steel



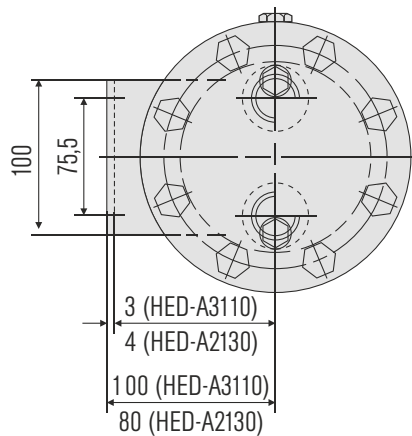
Connections	
N2	Cooling water OUT
N1	Cooling water IN
N4	Process/barrier medium OUT
N3	Process/barrier medium IN
N7/N8	Process/barrier circuit vent
N5	Cooling circuit vent
N6	Cooling water drain

Other versions on request.

1) These values are based on the calculation of strength.

2) These values are based on the calculation of heat.

\*) With reference to water



### Typical Industrial Applications

Chemical industry  
Oil and gas industry  
Petrochemical industry  
Power plant technology  
Refining technology

### Notes

Cleaning:

Cooling water side: the area around the tubes can be cleaned mechanically after the housing is removed.

Process/barrier medium side: flush with a suitable solvent.

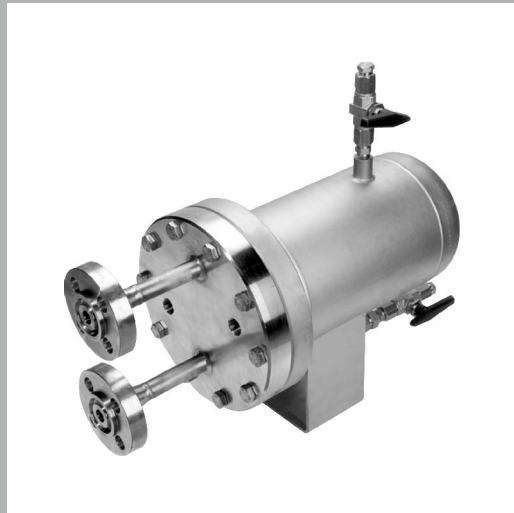
### Standards

PED 97/23 EC (Design and production in accordance with EU Pressure Equipment Directive)

ASME VIII, Div. 1 (Design, calculation and production)

### Technical Features

Designation	Tubes	Shell
Pressure Equipment Directive	PED	
Allowable pressure <sup>1)</sup>	16 bar (232 PSI)	130 bar (1 885 PSI)
Allowable temperature <sup>1)</sup>	150 °C (302 °F)	
Inlet temperature <sup>2)</sup>	30 °C (86 °F)	65 °C (149 °F)
Flow quantity (m <sup>3</sup> /h <sup>2)</sup> )	1	approx. 0.5
Volume (liters)	0.23	1.4
Cooling surface <sup>2)</sup>	0.2	
Cooling capacity (kW) <sup>3)</sup>	6	
Metal parts	SS 316	
O-Rings	Viton®	
Gaskets	PTFE	
Screws	Stainless steel A4-70	



**Features**

Heat exchangers of the HE range are used to cool process/barrier fluids in seal supply circuits. HE heat exchangers are available in two standard sizes and are API 682 conform. The process/barrier medium is directed through the tube and the cooling medium through the shell. For simple draining or venting of the cooling water side, the heat exchanger can also be supplied with ventilation/drainage ball valves. In addition, the heat exchangers can also be combined with a temperature instrument in the supply line to the mechanical seal (optional in accordance with API 682).

Circulation in accordance with API 682 / ISO 21049: Plan 21, Plan 22, Plan 23, Plan 41

**Advantages**

1. 1.4404 stainless steel: high resistance to corrosive media
2. Cooling water side and process side can be completely vented and drained
3. Heat exchanger can be dismantled: for optimum and simple cleaning of the tubes
4. Operating limits up to 45 bar / 260°C (tube side): suitable for a wide range of demanding operating conditions.

**Typical Industrial Applications**

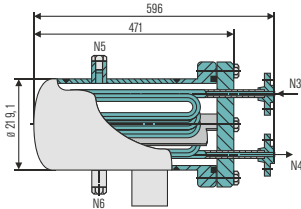
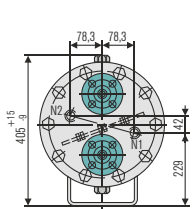
Chemical industry  
Oil and gas industry  
Petrochemical industry  
Refining technology

**Notes**

Cleaning:  
Cooling water side: the area around the tubes can be cleaned mechanically after the housing is removed.  
Process/barrier medium side: flush with a suitable solvent.

**Standards**

PED 97/23 EC (Design and production in accordance with EU Pressure Equipment Directive)  
ASME VIII, Div. 1 (Design, calculation and production)



**Product Variants**

Designation	HE6045 - A001		HE6045/M018-D0	
	Tube	Shell	Tube	Shell
Pressure Equipment Directive	ASME		ASME	
For shaft diameters > 60 mm (acc. to API682)	x		x	
Ball valve for draining on the cooling water side			Yes	
Connections	3/4" flange	3/4 NPT	3/4 NPT	3/4 NPT
Design pressure <sup>1)</sup>	45 bar (653 PSI)	16 bar (232 PSI)	45 bar (653 PSI)	16 bar (232 PSI)
Design temperature <sup>1)</sup>	260 °C (500 °F)	150 °C (302 °F)	260 °C (500 °F)	150 °C (302 °F)
Cooling capacity (kW) <sup>*)</sup>	6		6	
Metal parts	1.4404		1.4404	
O-Rings	Viton®		Viton®	
Screws	Stainless steel A4-70		Stainless steel A4-70	

Other versions on request.

1) These values are based on the calculation of strength.

\*) Related to water on both sides

Version with higher design pressure levels.



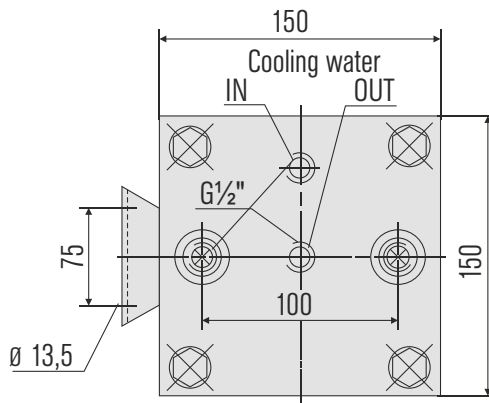
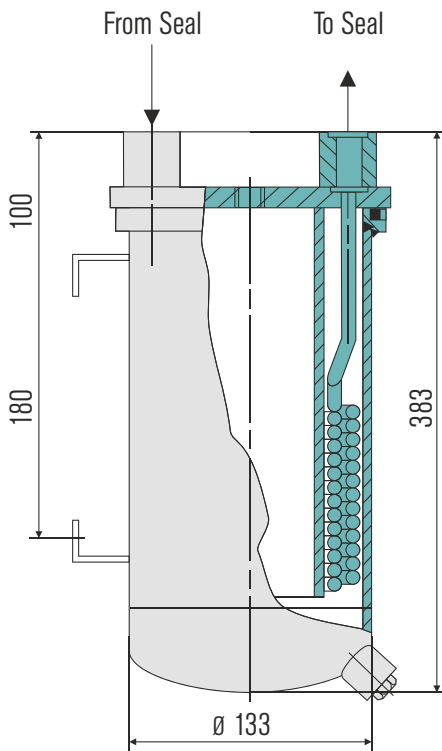
### Product Description

HEK-A5120 heat exchangers are used to cool process/barrier fluids in seal supply circuits. The heat exchanger has a wound double helix around the guide tube. Process/barrier medium in the tubes, cooling medium around the tubes.

Circulation in accordance with API 682 / ISO 21049: Plan 21, Plan 22, Plan 23, Plan 41

### Technical Features

1. Effective cooling: with wound double helix around a guide tube
2. Cooling capacity up to 10.5 kW  
Excellent value for money
3. Vessel can be dismantled: for optimum cleaning of the cooling water side
4. Universal usage: parts in contact with the buffer medium are made of stainless steel



### Typical Industrial Applications

Chemical industry  
Petrochemical industry  
Power plant technology  
Refining technology  
Oil and gas industry

### Standards

PED 97/23 EC (Design and production in accordance with EU Pressure Equipment Directive)

### Notes

Mount vertically with connections pointing up. Provide for external venting on the process/barrier medium side (the user has to install a vent at the highest point of the pipe work).

Cleaning:

Cooling water side: the area around the tubes can be cleaned mechanically after the housing is removed.

Buffer medium side: flush with a suitable solvent.

### Technical Features

Designation	Tube	Shell
Pressure Equipment Directive	PED	
Allowable pressure <sup>1)</sup>	120 bar (1740 PSI)	16 bar (232 PSI)
Allowable temperature <sup>1)</sup>	160 bar (2321 PSI)	95 bar (1378 PSI)
Inlet temperature <sup>2)</sup>	70 °C (158 °F)	25 °C (77 °F)
Flow rate <sup>2)</sup>	10 l/min	1.8 m <sup>3</sup> /h
Volume (liters)	0.34	1.13
Cooling surface <sup>2)</sup>	0.3 m <sup>2</sup>	
Cooling capacity (kW)	10.5	
Metal parts	SS 316	Carbon steel, primed on the outside
Seals		Viton®
Screws		Stainless steel A4-70

Other versions on request.

1) These values are based on the calculation of strength.

2) These values are based on the calculation of heat.

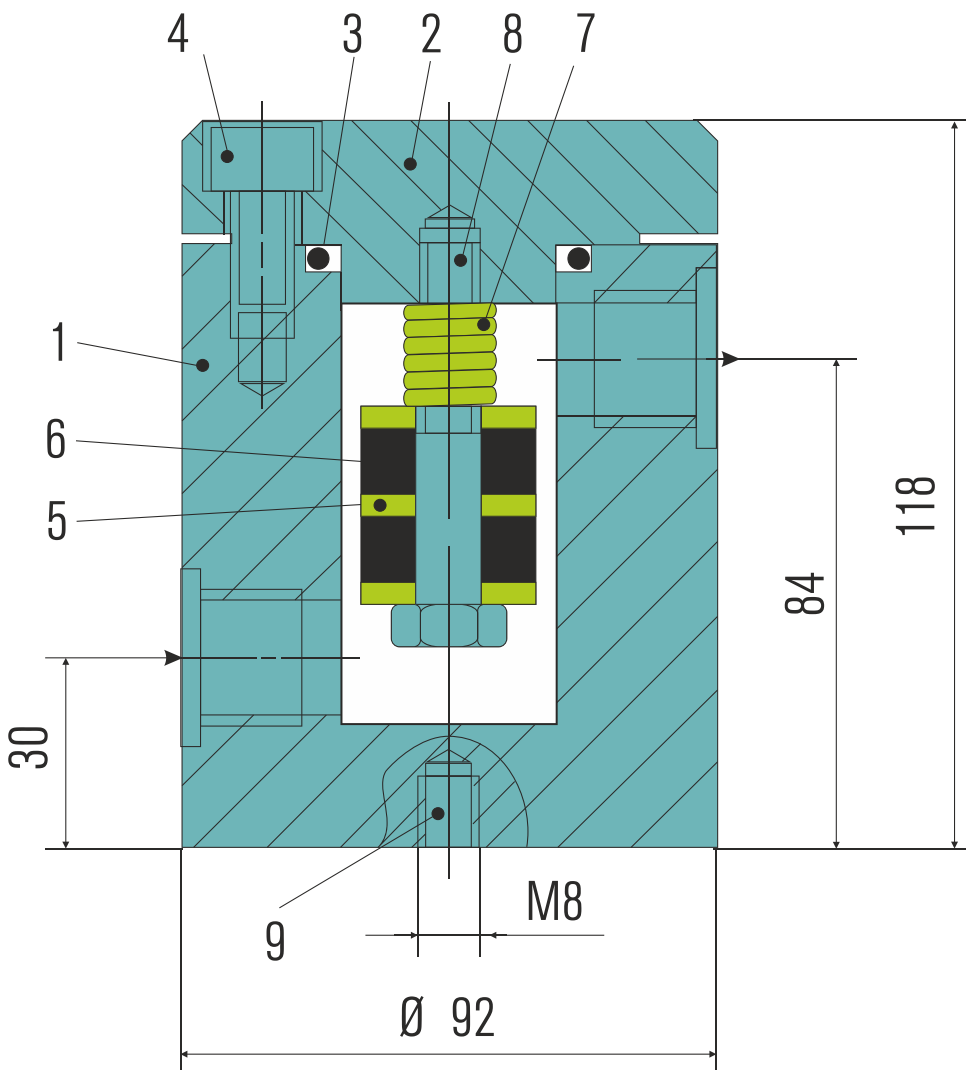


### Product Description

Magnetic separators of the MS-A range consist of a pressure casing with integrated magnetic rod. Magnetic separators are used in seal supply systems and any other such systems in which a liquid has to be cleaned of magnetic impurities.

### Technical Features

1. For operating pressures of up to 150 bar
2. Housing can be dismantled: simple maintenance and cleaning
3. Reliable and rugged technology



### Typical Industrial Applications

Chemical industry  
 Oil and gas industry  
 Petrochemical industry  
 Power plant technology  
 Refining technology

### Functional Description

The magnetic rod is positioned in the casing in such a way that it catches magnetic particles flowing past in the medium on all sides.

### Operating and Installation Schematic

#### Cleaning:

The magnetic rod can be removed for cleaning with the casing fitted by opening the cover (with the line depressurized!).

Maintenance intervals depend on the degree of soiling. We recommend checking and if necessary cleaning the magnetic rod several hours after using for the first time and each time after flushing the pipes because experience indicates that much of the dirt is flushed out of the pipes at this time.

Item	Description
1,2	Casing and cover: SS 316
3	O-Ring: E
4,8	8 Screws: A4 – 70 stainless steel
5	Washers: T2
6	Ring magnets: corrosion-resistant
7	Spring: 1.4301
8	Fixing hole

### Technical Features

Description	Connection	Allowable pressure	Allowable temperature	Volume (liters)	weight approx.	Cover, housing	Spring	O-Ring	Gasket
MS-A	G 1/2"	120 bar (1,740 PSI)	160 °C (320 °F)	0.08	5.5 kg. 12.2 lbs	SS 316	1.4301	EPDM	T2

- 1) Higher values on request
- 2) Other materials on request



### Product Description

1. MF-A filters are inline filters for installation inside pipelines.
2. Magnetic filters are used in seal supply systems and any other such systems in which a liquid has to be cleaned of magnetic and non-magnetic impurities up to a certain size.
3. The combination of magnetic rod and filter element guarantees a high level of efficiency.

### Technical Features

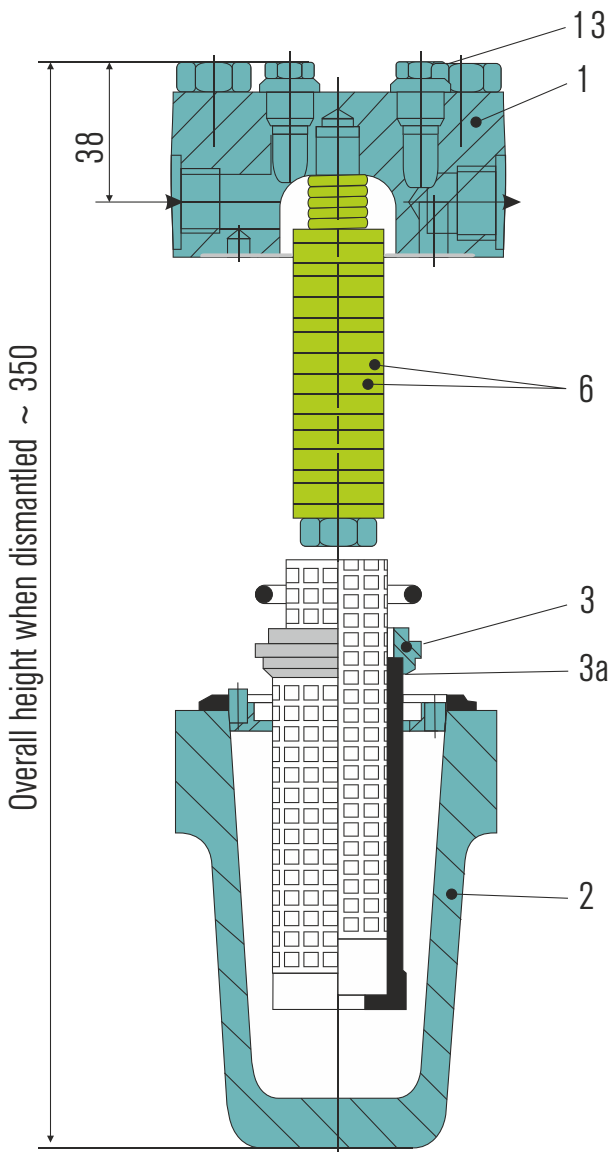
1. All pressure-loaded parts are forged components.
2. Combination device: magnetic filter and filter element
3. Housing can be dismantled: simple maintenance and cleaning.
4. Internal mesh to protect the filter element for reverse currents.
5. Venting screws in the filter inlet and outlet can be used as connections for maintenance or differential pressure indicator.

### Typical Industrial Applications

Chemical industry  
 Oil and gas industry  
 Petrochemical industry  
 Power plant technology  
 Refining technology

### Functional Description

The magnetic rod is positioned in the filter in such a way that it catches magnetic particles flowing past in the medium on all sides. Partial coarse filtration is provided by the incorporated filter element.

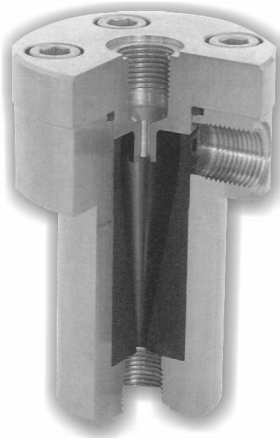


Item	Description
1	Filter cover
2	Filter barrel
3	Element insert
3a	Internal mesh
6	Ring magnet
13	Venting screw

### Technical Features

Designation	Connection	Allowable pressure	Allowable temperature <sup>1)</sup>	Filter grade	Weight (approx.)	Housing, filter head	Filter insert, filter element <sup>2)</sup>	O-Ring	Gasket
MF-A	G 1/2"	63 bar (913 PSI)	150 °C (302 °F)	50 µm	7.8 kg (17.2 lb)	1.4571	1.4301	Viton®	T2

- 1) Higher values on request  
 2) Other materials on request

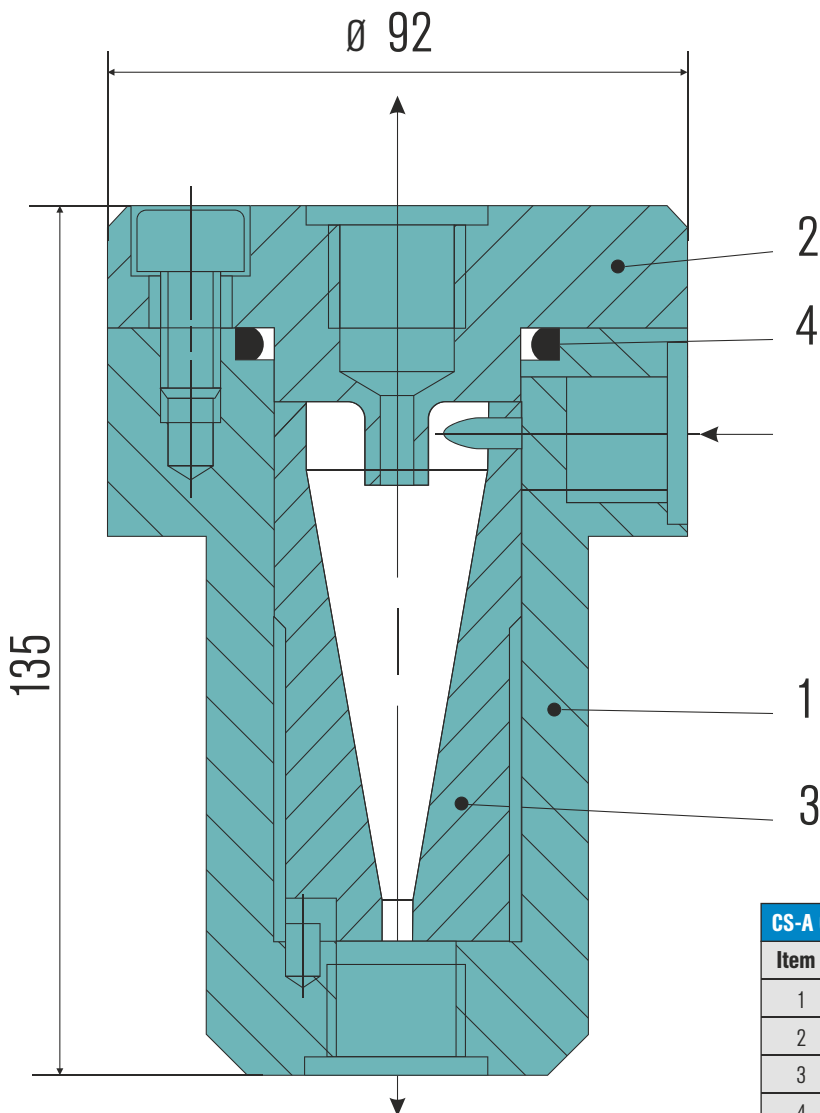


### Product Description

1. Circulation in accordance with API 682 / ISO 21 049: Plan 31, Plan 41
2. The **CS-A** range is available in three basic versions i.e. cyclone separator with replaceable insert made of elastomer or ceramic or cast version of the cyclone separator or cyclone separator for high flow rates and high pressures.

### Technical Features

1. Available for operating pressures of up to 200 bar
2. Dirt is automatically conveyed to the suction nozzle of the pump: maintenance-free mode of operation for guaranteed reliability
3. High filtration efficiency
4. Optional in block-type design with integrated flange connections: low space requirements because of compact design.
5. Wide range of products for the optimum solution for every application.



**CS-A Cyclone Separator**

Item	Description
1	Housing
2	Cover
3	Insert
4	O-Ring

### Typical Industrial Applications

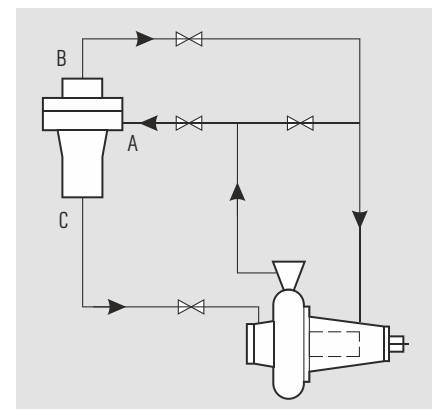
Chemical industry  
 Oil and gas industry  
 Petrochemical industry  
 Refining technology  
 Water and waste water technology

### Functional Description

Cyclone separators of the **CS-A** range are used to clean mainly aqueous liquids containing dirt and solids (e.g. in circulation systems of sewage, sludge or pipeline pumps). The best possible filtration efficiency is achieved when the specific weight of the solids is much higher than that of the carrier liquid, and when the differential pressure is as large as possible within the permissible pressure range (min. 1.7 bar in accordance with API 682). The viscosity of the medium is also a factor that needs to be taken into account.

### Operating and Installation Schematic

The cyclone separator must always be installed in the vertical position. The pressure at the outlets (C) and (B) must be lower than at the inlet (A). Cleaned liquid is conveyed to the top (B) and the separated dirt to the suction port of the pump.



### Technical Features

Description	Insert	Allowable pressure <sup>1)</sup>	Allowable temperature <sup>1)</sup>	Connections	Connecting size	Housing/cover	O-Ring
<b>CS-A</b>	Ceramic	64 bar (928 PSI)	125 °C (257 °F)	G, R, NPT, Flange	1/2"	1.4571	Viton®
	Elastomer	64 bar (928 PSI)	60 °C (140 °F)	G, R, NPT, Flange	1/2"	1.4571	Viton®

1) Higher values on request  
 2) Other materials on request



# API 682 ISO 21049

## Operating range

API 682 covers the following ranges:  
 Shaft sizes: 20 to 110 mm  
 Temperatures: -40 °C to +400 °C  
 Pressures: 0 bar absolute to 42 bar absolute

**“Sealing systems for centrifugal pumps, API 682” is the title of the standard issued by the American Petroleum Institute for pumps in the hydrocarbon processing industry. The API 682, 3rd edition, to ISO 21049, contains sealing and supply systems for applications in refineries and the chemical industry.**

- API 682 includes a seal selection procedure as well as an aid for selecting buffer/quench fluids, seal supply systems and modes of operation.
- Cartridge solutions are specified for all applications. API 682 requires all parts of the seal (including its cover and shaft sleeve) to be supplied by the seal manufacturer.
- For the purposes of qualifying the seals, all standard types and arrangements have to be put through stipulated dynamic trial runs under defined conditions.

## Type A O-ring seal

- Rotating O-ring seal with multiple springs
- Sliding faces: reaction-bonded silicon carbide against blistering-resistant carbon
- Fluoroelastomer O-rings
- Hastelloy® C-springs
- Metallic components (cover, shaft sleeve etc.) made of stainless steel (type 316)

## TYPE B Bellows seal

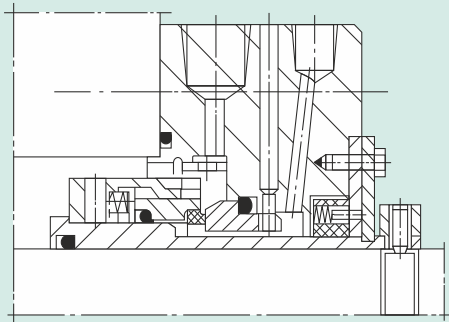
- Rotating metal bellows seal with tiring secondary seals
- Sliding faces: reaction-bonded silicon carbide against blistering-resistant carbon
- Fluoroelastomer O-rings
- Hastelloy® C bellows
- Metallic components (cover, shaft sleeve etc.) made of stainless steel (type 316)

## TYPE C Bellows seal

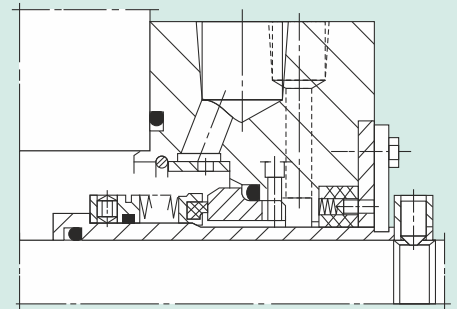
- Stationary metal bellows seal with graphite secondary seals
- Sliding faces: reaction-bonded silicon carbide against blistering-resistant carbon
- Graphite secondary seals
- Inconel® 718 bellows
- Metallic components (cover, shaft sleeve etc.) made of stainless steel (type 316)

## Type ES

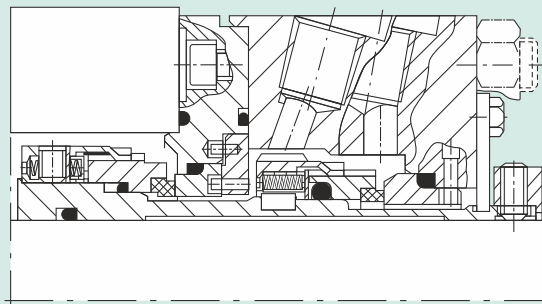
- Special seal design



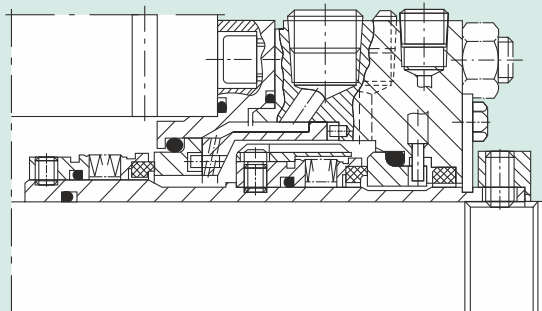
1-HFA-21-13  
 $t = -40 \dots +260 \text{ } ^\circ\text{C}$   
 $P_t = 0 \dots 42 \text{ bar}$   
 $v_g = 25 \text{ m/s}$



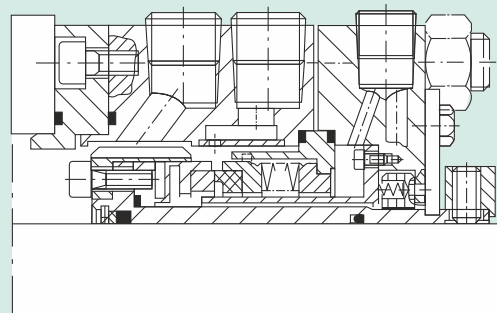
**Single seal Type A/B Arrangement 1** IFA-13  
 $t = -40 \dots +280 \text{ } ^\circ\text{C}$   
 $P_i = 0 \dots 25 \text{ bar}$



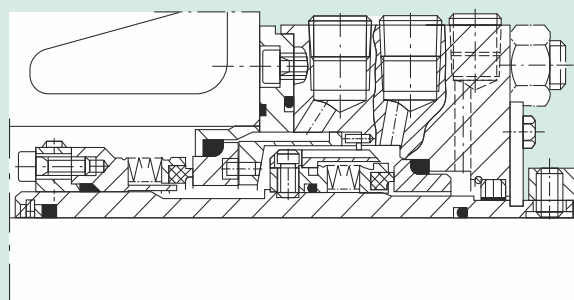
**Dual seal Type A Arrangement 2 or 3**  
 1-HFA-21-10/...-PTA  
 $t = -40 \dots +260 \text{ } ^\circ\text{C}$   
 $p_1 = 0 \dots 42 \text{ bar}$   
 $\Delta p (p_3 - p_1) \leq 10 \text{ bar}$   
 $v_g = 25 \text{ m/s}$



**Dual Seal Type B Arrangement 2**  
 IFA/...-PTA  
 $p_1 \dots 25 \text{ bar}$   
**Arrangement 3**  
 JAA/...-PTA  
 $p_3 = \text{max. } 27 \text{ bar}$



**Single seal Type C Arrangement 1**  
 GFA-18K/...-EP  
 $t = -40 \dots +400 \text{ } ^\circ\text{C}$   
 $p_1 = 0 \dots 25 \text{ bar}$   
 $v_g = 50 \text{ m/s}$

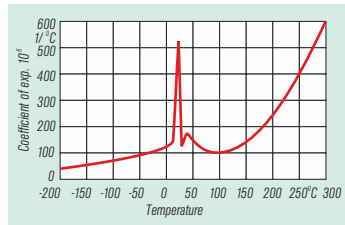


**Dual Seal Type ES Arrangement 2**  
 $t = -40 \dots +400 \text{ } ^\circ\text{C}$   
 $v_g = 20 \text{ m/s}$   
 UFL22-19IAA/...-PTA  
 $p_1 \dots 25 \text{ bar}$   
**Arrangement 3**  
 UFL22-19JAA/...-PTA  
 $p_3 = \text{max. } 27 \text{ bar}$

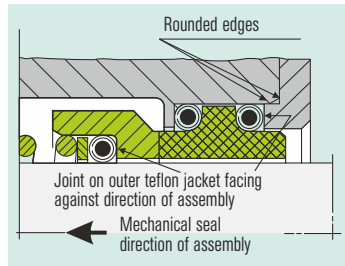
# Technical Information

## TTV-O-Rings

Double PTFE-encapsulated O-rings of the type used in ADDENSEO mechanical seals combine the elasticity of the core materials (synthetic rubber) with the chemical and thermal resistance of the PTFE. The material PTFE features good chemical and thermal resistance, but it also displays a high degree of



rigidity, a low coefficient of thermal conductivity, an unfavourable expansion characteristic (see graph) and a tendency to cold flow. It is advisable, therefore, to avoid the use of **O-rings made of solid PTFE**.



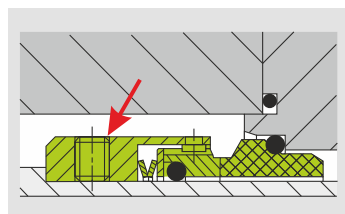
The assembly position of double PTFE-encapsulated elastomers is critical. Care must be taken to ensure that the joint on the outer jacket faces against the assembly direction, as otherwise there is a risk of the jacket opening and being pulled off.

Bending of the jacket must be avoided at all costs to prevent leaks. Slip TTV rings onto tubes for safe storage.



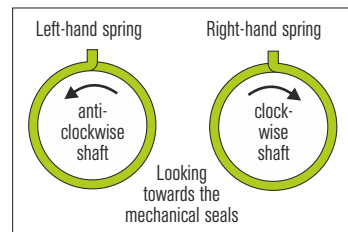
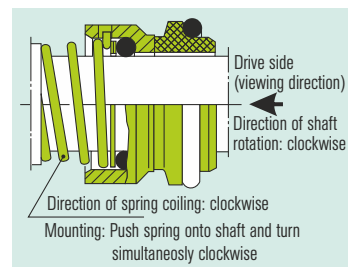
## Screw locking

If no special provision is made for locking screw thread, use set screw with a suitable adhesive (e.g. Loctite) after removing any grease.



## Conical springs

When a conical spring is used for driving the seal (e.g. in standard types CAA and DAA), the mechanical seal becomes **dependent on the direction of rotation**. Looking toward the sliding face of the rotating parts of the seal, shafts rotating in clockwise direction require right-hand springs and shafts rotating in anti-clockwise direction require left-hand springs. Mounting the conical spring is easier if you twist it onto the shaft with a screwing action in the same direction as the spring coiling. This screwing action will cause the spring to open. For brief re-versals of the direction of rotation we recommend seal type "S30".



## Pressure vessel regulations

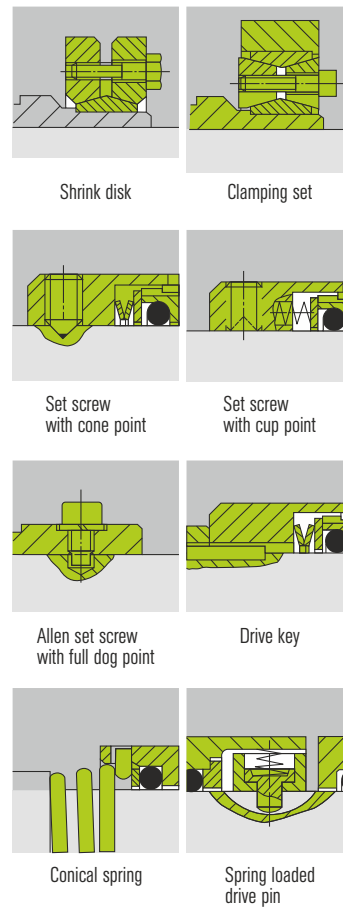
Requirements imposed by various international standards for Pressure Vessel Code on Group III pressure vessels (Section 8)

- International Pressure Vessel Code orders that pressure vessels be built and operated in accordance with the generally valid rules of engineering (such as the German AD Code, ASME etc).
- AD Bulletin W2 requires every pressure-bearing part made of austenitic steel to be accompanied by a material certificate EN 10204 3.1 B or 3.1 C.
- The manufacturer must subject every pressure vessel to a pressure test.
- Every pressure vessels must be issued with a certificate confirming its correct production and pressure testing in accordance with the Pressure Vessel Code. This certificate is included with the delivery.

## Types of drive

For a seal to function properly, the shaft torque must be transmitted uniformly to the shaft sleeve and/or rotating parts under all operating conditions. Depending on the seal design it is necessary to make allowance for centrifugal and axial forces and in some case to observe special in-stallation instructions. Incorrect fitting can cause, for example, jamming and deformation of the seal.

### Typical arrangements



## Shrink disk

The pressure necessary for the transmission of torque is generated through clamping force on lubricated conical surfaces. The shrink disk couplings can be released at any time by slackening the tensioning screws. All the parts involved are subjected to elastic deformation only, so the original clearance is restored once the screws are released. Provided the conical surfaces are undamaged, the shrink disks can be retensioned any number of times (ensure correct lubrication). Shaft sleeves should not have a clearance diameter under the shrink disk and should make full contact with the shaft.

## Viscosity $\nu$

### Conversion table\*

The following conversion table shows the kinematic viscosity  $\nu$  in terms of conventional units of measurement at the same temperature.

$\nu$ mm <sup>2</sup> /s	°E	R.I sec	SU sec
1.0	1.00	-	-
1.5	1.06	-	-
2.0	1.12	30.4	32.6
2.5	1.17	31.5	34.4
3.0	1.22	32.7	36.0
3.5	1.26	34.0	37.6
4.0	1.31	35.3	39.1
4.5	1.35	36.6	40.8
5.0	1.39	38.0	42.4
5.5	1.44	39.3	44.0
6.0	1.48	40.6	45.6
6.5	1.52	42.0	47.2
7.0	1.57	43.3	48.8
7.5	1.61	44.7	50.4
8.0	1.65	46.1	52.1
8.5	1.70	47.5	53.8
9.0	1.74	49.0	55.5
9.5	1.79	50.4	57.2
10.0	1.83	51.9	58.9
11.0	1.93	54.9	62.4
11.5	1.98	56.4	64.2
12.0	2.02	58.0	66.0
12.5	2.07	59.6	67.9
13.0	2.12	61.2	69.8
13.5	2.17	62.9	71.7
14.0	2.22	64.5	73.6
14.5	2.27	66.2	75.7
15.0	2.33	67.8	77.4
15.5	2.38	69.5	79.3
16.0	2.43	71.2	81.3
16.5	2.49	72.9	83.3
17.0	2.54	74.6	85.3
17.5	2.59	76.3	87.4
18.0	2.65	78.1	89.4
18.5	2.71	79.8	91.5
19.0	2.76	81.6	93.6
19.5	2.82	83.4	95.7
20.0	2.88	85.2	97.8
25.0	3.47	103.9	119.3
30.0	4.08	123.5	141.3
35.0	4.71	143.4	163.7
40.0	5.35	163.5	186.3
50.0	6.65	203.9	232.1
60.0	7.95	244.3	278.3
70.0	9.26	284.7	324.4
80.0	10.58	325.1	370.8
90.0	11.89	365.6	417.1
100.0	13.20	406.0	463.5
150.0	19.80	609.0	695.2
200.0	26.40	812.0	926.9
250.0	33.00	1015.0	1158.7
300.0	39.60	1218.0	1390.4
350.0	46.20	1421.0	1622.1
400.0	52.80	1624.0	1853.9
500.0	66.00	2030.0	2317.4
600.0	79.20	2436.0	2781.0
700.0	92.40	2842.0	3244.5
800.0	105.60	3248.0	3708.0
900.0	118.80	3654.0	4171.5
1000.0	132.00	4060.0	4635.0

Conventional units of measurement:

°E = degrees Engler

R = Redwood Seconds I and II

SU = Saybolt Universal seconds

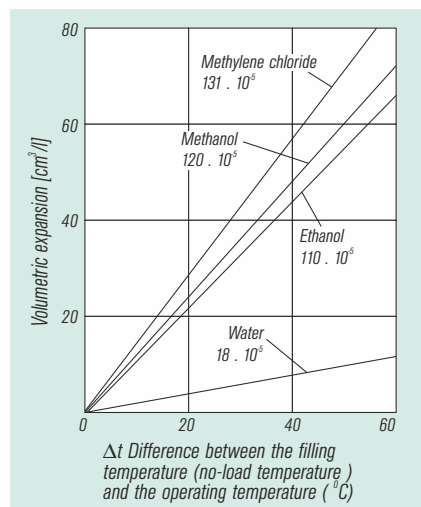
\* according to Ubbelohde mm<sup>2</sup>/s  $\Delta$  cSt

## Circulation systems to API 682/ISO 21049

### Buffer medium

The buffer medium fulfills two functions - it dissipates the heat generated by the seal and it prevents the product from penetrating the sealing gap to any appreciable degree. Any liquid and any gas can be chosen as buffer medium, with due consideration to the corrosion resistance of the parts it comes into contact with and to its compatibility with the process medium and surroundings. The buffer medium must not contain any solids. It is particularly important that liquid buffer media do not tend to precipitate and that they have a high boiling point, a high specific thermal capacity and good thermal conductivity. Clean, demineralised water satisfies these requirements to a high degree.

Hydraulic oil is often used in buffer fluid units and water in closed buffer fluid circuits.

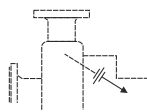


### Volumetric expansion of various buffer media

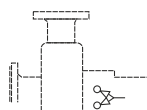
#### Legend

- Cooler
- Cyclone separator
- Strainer
- Flow control valve
- Block valve
- Non return valve
- Orifice
- Drain
- Flush
- Flow indicator
- LBI
- LBO
- LI
- LSH
- LSL
- PI
- PS
- PSL
- TI
- Q

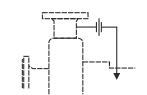
### Clean pumping media



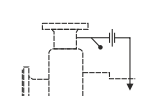
**Plan 1**  
Internal circulation from the pump case to the seal.



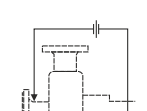
**Plan 2**  
Dead end seal chamber with no circulation. Stuffing box cooling and a neck bush are necessary, un-ass otherwise specified.



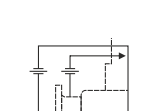
**Plan 11**  
Circulation from the pump discharge through an orifice to the seal.



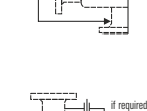
**Plan 12**  
Circulation from the pump discharge through a strainer and an orifice to the seal.



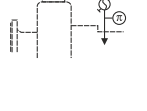
**Plan 13**  
Circulation from the seal chamber through an orifice and back to pump suction.



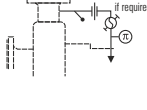
**Plan 14**  
Circulation from pump discharge through orifice to seal chamber and trough orifice back to pump suction. (Combination of Plan 11+13).



**Plan 21**  
Circulation from the pump discharge through an orifice and a cooler to the seal.

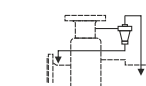


**Plan 22**  
Circulation from the pump discharge through a strainer, an orifice and a cooler to the seal.

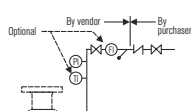


**Plan 23**  
Circulation by means of a pumping ring from the seal, through a cooler and back to the seal.

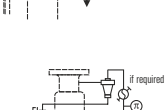
### Contaminated and special pumping media



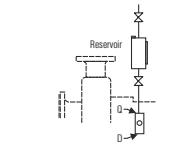
**Plan 31**  
Circulation from the pump discharge through a cyclone separator.



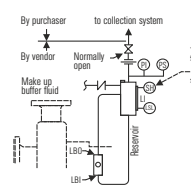
**Plan 32**  
Injection of clean fluid into the seal chamber from an external source



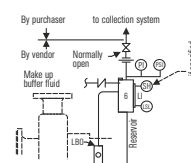
**Plan 41**  
Circulation from the pump case through a cyclone separator, and clean fluid through a cooler to the seal.



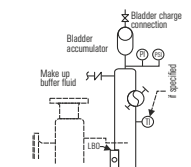
**Plan 51**  
Dead-end quench (usually methanol)



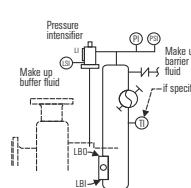
**Plan 52**  
External fluid reservoir, pressurises, thermosiphon or forced circulation as required.



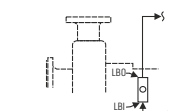
**Plan 53A**  
Circulation with thermosiphon system, pressurized. Forced circulation by pumping ring or circulation pump.



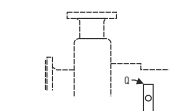
**Plan 53B**  
Circulation with bladder accumulator and cooler, pressurized. Forced circulation by pumping ring or circulation pump.



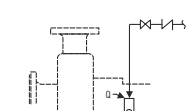
**Plan 53C**  
Circulation with pressure booster and cooler. Pressurized by reference pressure of seal chamber. Forced circulation by pumping ring or circulation pump.



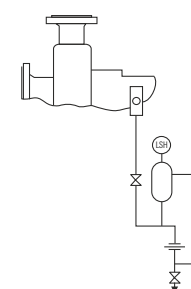
**Plan 54**  
Circulation of clean fluid from an external system.



**Plan 61**  
Tapped connections for the customer's use.



**Plan 62**  
External fluid quench (steam, gas, water, etc.)



**Plan 65**  
External drainage of high leakage controlled by a floating switch.

## Symbols

<b>A</b>	Area of sliding face
<b>A<sub>H</sub></b>	Area hydraulically loaded by medium pressure
<b>b</b>	Width of sliding face
<b>c</b>	Specific heat capacity
<b>D</b>	Outer diameter of sliding face
<b>d</b>	Inner diameter of sliding face
<b>D<sub>a</sub></b>	Outer diameter of bellows
<b>d<sub>H</sub></b>	Hydraulic diameter
<b>D<sub>i</sub></b>	Inner diameter of bellows
<b>d<sub>m</sub></b>	Mean diameter of sliding face
<b>D<sub>w</sub></b>	Diameter of shaft
<b>f</b>	Coefficient of friction
<b>F<sub>r</sub></b>	Spring force
<b>h</b>	Gap width
<b>H</b>	Delivery head of pumping screw
<b>k</b>	Balance ration
<b>k<sub>1</sub></b>	Pressure gradient factor
<b>n</b>	Speed
<b>p<sub>1</sub></b>	Medium pressure
<b>p<sub>2</sub></b>	Atmosphere pressure
<b>p<sub>3</sub></b>	Buffer fluid pressure
<b>Δp</b>	P <sub>1</sub> -P <sub>2</sub> ; P <sub>3</sub> -P <sub>1</sub> ; P <sub>3</sub> -P <sub>2</sub>
<b>p<sub>f</sub></b>	Spring pressure
<b>P<sub>G</sub></b>	Sliding pressure
<b>P<sub>r</sub></b>	Calculated load for the frictional force of the secondary seal
<b>P<sub>R</sub></b>	Power consumption of sliding faces
<b>P<sub>v</sub></b>	Turbulence loss through rotating parts
<b>V</b>	Delivery rate
<b>Q</b>	Mechanical seal leakage rate
<b>R<sub>a</sub></b>	Mean roughness index (calculated)
<b>t, T</b>	Temperature of the medium to be sealed
<b>ΔT</b>	Rise in temperature of the medium to be sealed
<b>t<sub>3</sub></b>	Temperature of the buffer medium
<b>V<sub>g</sub></b>	Sliding velocity
<b>η</b>	Dynamic viscosity
<b>χ</b>	Load factor
<b>ρ</b>	Density
<b>ν</b>	Kinematic viscosity

# Technical Information

## Seal and Material Code to API 682/ISO 21049

### Seal designations compliant with ISO 21049 1st Issue and API 682 3rd Edition

The seal description was redefined in ISO 21048, Annex D. Contrary to the earlier arrangement, no details such as the face and O-ring materials used are included in the designation. Such details are now to be found only in the seal data sheet.

### The following rule applies for seal codes with four or more digits.

#### 1st digit Seal Category

Here a C is used followed by the corresponding category number 1, 2 or 3 to which the seal belongs.

#### 2nd digit Arrangement

Here an A is used followed by the number 1, 2, or 3 according to the seal arrangement applied.

#### 3rd digit Seal Type

Here the letter A, B or C is used according to the seal in question.

### 4th digit and other Supply System Plans

The cooling and/or flushing diagrams used are listed here one after the other without separating commas.

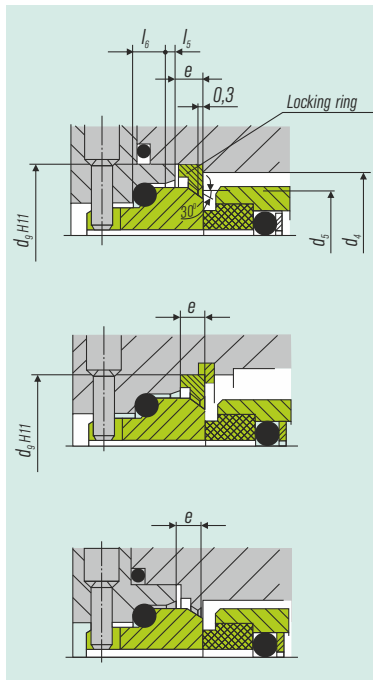
#### Example 1:

C1A1A1 1  
Seal category 1  
Seal arrangement 1 (single seal)  
Seal type A (O-ring seal)  
Product circulation according to Plan 1 1

#### Example 2:

C3A2B1 1 52  
Seal category 3  
Seal arrangement 2 (double seal pressureless)  
Seal type B (rotating metal bellows seal)  
Product circulation according to Plan 1 1  
Pressureless quench according to Plan 52

## Seal locking \*) to EN 12756



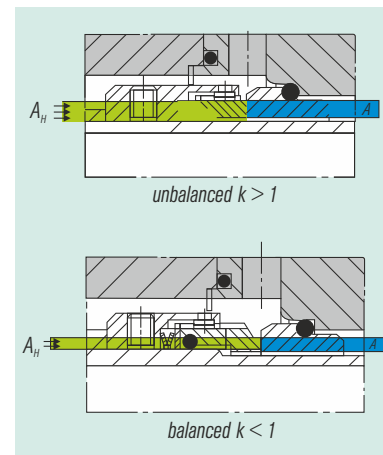
d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>		l <sub>1</sub>	l <sub>2</sub>	e	d <sub>4</sub>		
		U	B						
10	14	22	26	26	30	1.5	4	4	.
12	16	24	28	28	32	1.5	4	4	.
14	18	26	34	30	38	1.5	4	4	.
16	20	23	36	32	40	1.5	4	4	.
18	22	34	38	38	42	2.0	5	4	31.2
20	24	36	40	40	43	2.0	5	4	33.2
22	26	38	42	42	46	2.0	5	4	35.2
24	28	40	44	43	48	2.0	5	4	37.2
25	30	41	46	46	50	2.0	5	4	38.2
28	33	44	49	48	53	2.0	5	4	41.2
30	35	46	61	50	60	2.0	5	4	43.2
32	38	48	58	53	62	2.0	5	4	46.2
33	38	49	58	53	62	2.0	5	4	46.2
35	40	51	60	60	65	2.0	5	4	48.2
38	43	58	63	62	67	2.0	6	6	53.5
40	45	60	65	66	70	2.0	6	6	55.5
43	48	63	68	67	72	2.0	6	6	58.5
45	50	65	70	70	75	2.0	6	6	60.5
48	53	68	73	72	77	2.0	6	6	63.5
50	55	70	75	75	86	2.5	6	6	67.5
53	58	73	83	77	86	2.5	6	6	70.6
55	60	75	85	86	91	2.5	6	6	72.6
58	63	83	88	88	93	2.5	6	6	75.6
60	65	85	90	91	96	2.5	6	6	77.6
63	68	88	93	93	98	2.5	6	6	80.6
65	70	90	95	96	103	2.5	6	6	82.6
68		93		98			6		88.6
70	75	95	104	103	108	2.5	7	6	90.2
75	80	104	109	108	150	2.5	7	6	95.2
80	85	109	114	120	125	3.0	7	6	103.0
85	90	114	119	125	130	3.0	7	6	108.0
90	95	119	124	130	135	3.0	7	6	113.0
95	100	124	129	135	140	3.0	7	6	117.5
100	105	129	134	140	145	3.0	7	6	122.5

\*) not applicable for seats made of carbon.

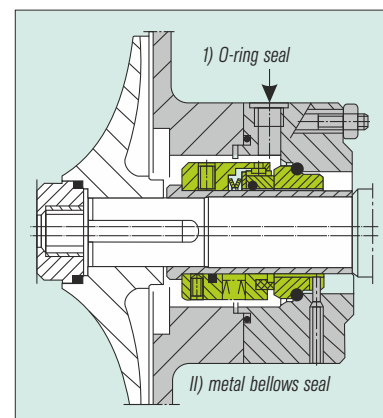
## Balance ratio

The balance ratio is a non-dimensional factor of the mechanical seal and is defined as

$$K = \frac{\text{hydraul. loaded area } A_H}{\text{area of sliding face } A}$$

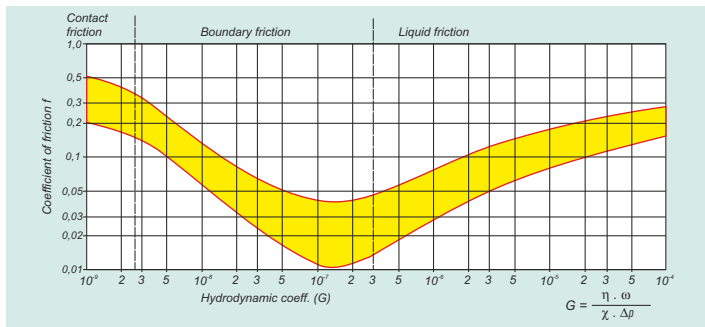


In practice k values are selected between 0.65 and 1.2. With a lower k value, the safety against thermal overload will increase, but the mechanical seal may also lift off more easily.



Unlike an O-ring seal, the hydraulic diameter of a bellows seal is not a fixed geometric value. It is conditional on the absolute level of the pressure to be sealed and on the direction of pressurization (internal or external pressure).

# Technical Information



## Load factor $\chi$

The balance ratio is just a non-dimensional factor used to assess a mechanical seal. A second one is the load factor  $\chi$ .

$$\chi = k + \frac{P_f \pm P_r}{\Delta p}$$

The balance ratio and the load factor are practically identical when the pressure differentials to be sealed are large. The friction at the dynamic secondary seals  $p_r$  is usually disregarded in the calculation.

## Sliding pressure $P_e$

The term "sliding pressure" is understood to be the surface pressure on the two sealing faces which remains after subtracting all those forces that act on the seal face and which are balanced by hydraulic pressures. The sliding pressure is conditional on the pressure differential to be sealed, the balance ratio, the pressure conditions inside the sealing gap i.e. gap between the seal faces (pressure gradient factor) and the spring pressure. The pressure gradient factor  $k$  can assume values between 0 and 1, depending on the geometry of the two sealing faces. For sealing gap geometries which converge in leakage direction - V-gap for externally pressurized seals - the value of  $k_1$  is  $> 0.5$ , while for sealing gap geometries which diverge in leakage direction - A-gap for externally pressurized seals - the value of  $k_1 < 0.5$ . For simplified calculations the value of  $k_1$  is generally taken to be 0.5. Under unfavourable conditions the sliding pressure can become negative, causing the sealing faces to open resulting in excessive leakage.

$$P_e = \Delta p \cdot (k - k_1) + P_f$$

## Coefficient of friction $f$

The coefficient of friction  $f$  is conditional on the materials that are in contact, the medium being sealed, the sliding velocity and the design-related conditions of contact between the sliding faces.

For general considerations and calculations (see following sections), a coefficient of friction of between 0.05 and 0.08 can be applied as a good approximation. As can be seen in the graph, a lower value is obtained under improved conditions of lubrication, e.g. due to partial build-up of hydrodynamic pressure in the sealing gap. On the other hand, when a mechanical seal is run under purely hydrodynamic conditions of operation, the coefficient of friction will rise as the speed increases - similar to hydrodynamic bearings.

## Gap width $h$

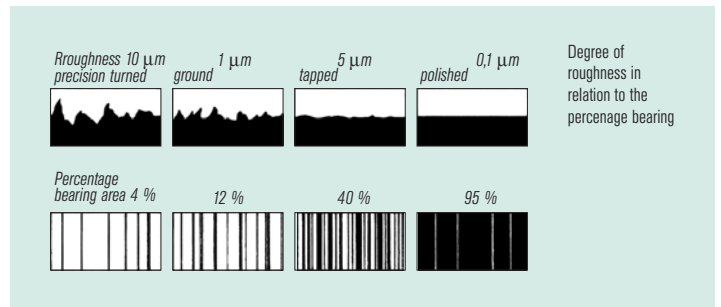
### Seals with contacting faces

In contact seals with a theoretically parallel sealing gap, the distance between the two sealing faces is conditional on the roughness of the surfaces.

Numerous measurements taken in the laboratory and in practice with due allowance for external factors indicate that a mean gap width of less than 1 mm can be used as a basis for calculating the normal degree of leakage.

### Seals with non-contacting faces

Hydrostatically or hydrodynamically balanced, non-contacting mechanical seals adjust automatically to a defined gap width during operation. The width of the gap depends mainly on the shape of the gap in radial as well as circumferential direction, on the operating conditions and on the medium.



## Surface roughness

Microfinished sliding faces made of various materials display the following average, arithmetic mean roughness values ( $R_a$ ):

Tungsten carbide, nickel-bonded	0,01 $\mu\text{m}$
Silicon carbide (SiC)	0,04 $\mu\text{m}$
Special cast Cr-steel	0,15 $\mu\text{m}$
Carbon graphite	0,10 $\mu\text{m}$
Aluminum oxide	0,15 $\mu\text{m}$
C-SiC-Si/C-SiC	0,15 $\mu\text{m}$

The lower the roughness value, the higher the percentage bearing area and hence the higher load capacity of a mechanical seal.

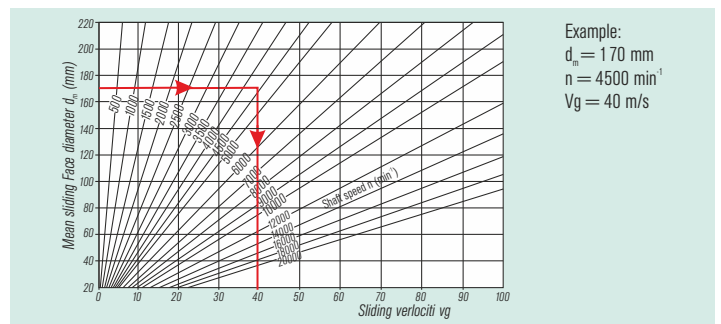
## Turbulence losses $P_v$

The turbulence-related consumption of power is not significant until the circumferential speed reaches 30 m/s. It must be given due consideration particularly with special seals.

## Power consumption

The total power consumption of a mechanical seal is calculated from

- The power consumed by the sliding faces.
- The power consumption due to turbulence created by the rotating parts.



## Sliding velocity $V_g$

The sliding velocity is usually quoted in relation to the mean sliding face diameter.

## Heat transfer

The total power consumption of a mechanical seal has to be dissipated into the medium or the buffer fluid by means of appropriate measures in order to stop the seal from overheating. The necessary fluid flow rate for removal of the power losses is calculated by

$$\dot{V} = \frac{PR + PV}{\Delta T \cdot c \cdot \rho}$$

Under certain conditions of installation or operation heat may pass from the product to the sealing compartment and will need to be taken into account when calculating the circulation rate.

### Example calculation:

$$\begin{aligned} P_R &= 420 \text{ W} \quad (1 \text{ W} = 1 \text{ J/s}) \\ \Delta T &= 10 \text{ K} \\ \text{Fluid: Water;} \\ c &= 4200 \text{ J} \cdot (\text{kg} \cdot \text{K}) \\ \rho &= 1 \text{ kg} / \text{dm}^3 \\ \dot{V} &= \frac{420 \text{ W} \cdot \text{kg} \cdot \text{K} \cdot \text{dm}^3}{10 \text{ K} - 420 \text{ Ws} - 1 \text{ kg}} \\ &= 0.01 \text{ l/s} = 0.6 \text{ l/min} \end{aligned}$$

# Technical Information

## Prior to installation

To fit a seal you will need its installation and operating instructions with the correct drawing. Before starting, check the dimensions, the maximum acceptable deviations and the geometrical tolerances of the machine.

### Edges and shoulders

All edges and shoulders onto or into which the mechanical seal is pushed during installation must be chamfered, deburred and rounded off to less than  $30^\circ \times 2$  mm.

### Dimensional deviations

Acceptable deviations for dimensions having no tolerance specification: ISO 2768

- Part 1, fine/medium for linear and angular dimensions
- Part 2, tolerance class K for general geometrical tolerances

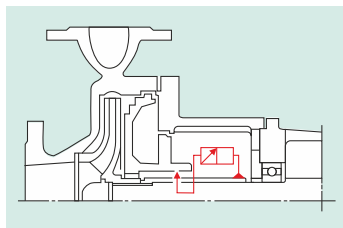
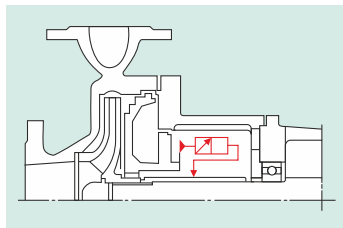
## Concentricity tolerance

### Shaft in accordance with ISO 5199

In the area of the mechanical seal the shaft concentricity tolerance must not exceed  $50 \mu\text{m}$  for diameters  $< 50$  mm,  $50 \mu\text{m}$ ,  $80 \mu\text{m}$  for diameters between 50 and 100 mm, and  $110 \mu\text{m}$  for diameters  $> 100$  mm.

### Seal chamber bore

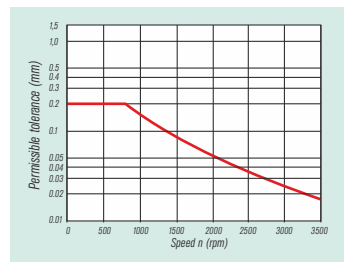
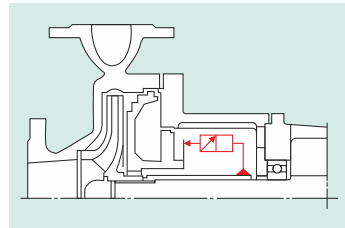
For sliding velocities of  $v_s < 25$  m/s the concentricity tolerance of the seal chamber in relation to the shaft should not exceed 3.2 mm, and when pumping screws are used it should not exceed 0.1 mm due to the effect of the pumping characteristic. If these values are exceeded please contact Sealmatic.



## Axial run-out

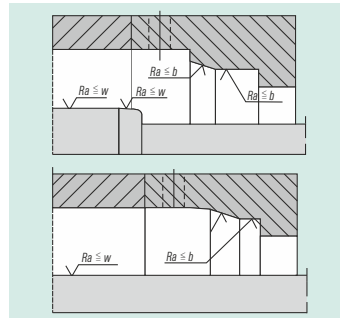
### Mounting face

Axial run-out depends on the speed. Permissible values are indicated by the graph.



## Surface finish

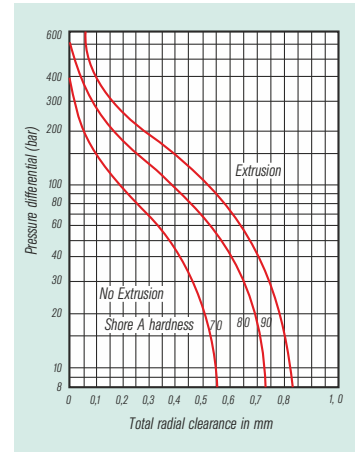
### Finished surfaces according to EN 12756



Secondary seal material	Mean roughness index $R_a$	
	b	w
Elastomers	$2.5 \mu\text{m}$	$2.5 \mu\text{m}$
Non-elastomers or optional use of elastomers and non-elastomers	$1.6 \mu\text{m}$	$0.2 \mu\text{m}$

## Extrusion characteristics of elastometric O-rings

The extrusion resistance of elastomeric O-rings can be greatly enhanced by the use of support rings.



## Installation

### Screw locking

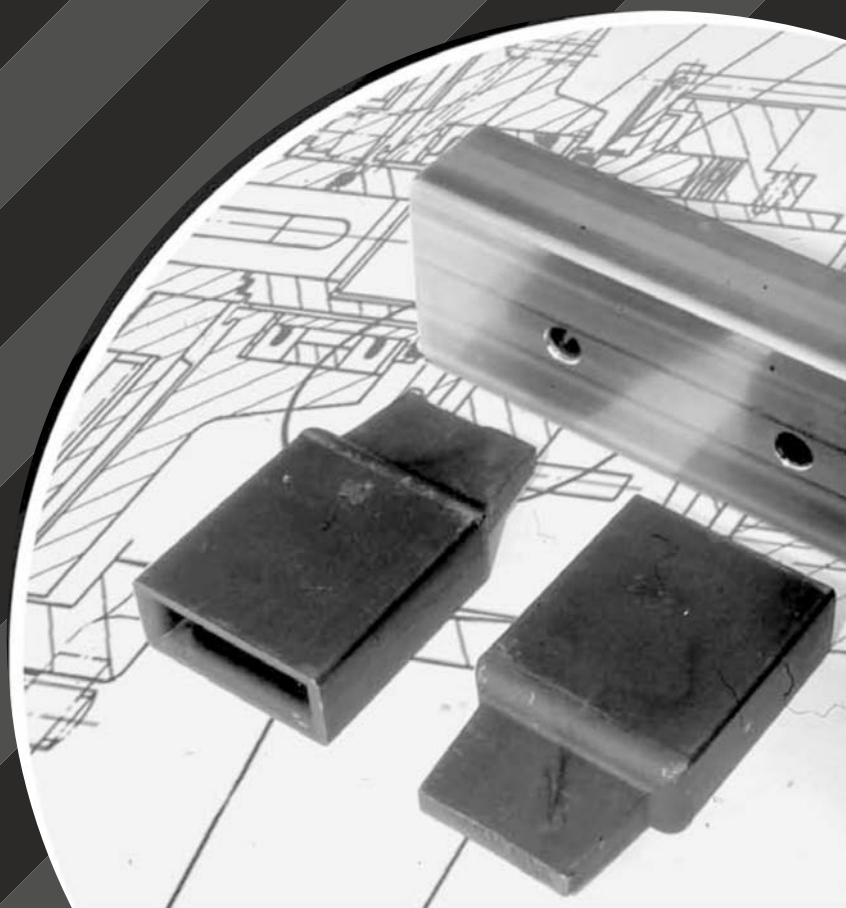
If no special provision is made for locking screw threads, use set screws with a suitable adhesive (e.g. Loctite) after removing any grease.

### Venting

To prevent damage to the sliding faces from dry running, the buffer space must be carefully vented **after you have installed the seal**. This is particularly important for those types of buffer fluid systems that do not vent themselves or are partially self venting (double seal with buffer fluid systems).

### Fitting advice

To reduce the friction on O-rings when mounting seals on a shaft or when inserting seal cartridges in their housing, apply a thin coating of silicon grease or oil to the shaft or housing (N.B.: this does not apply to elastomer bellows seals). Never allow EP rubber O-rings to come into contact with mineral oil or grease. When inserting stationary seats, be careful to apply even pressure and use only water or alcohol to reduce O-ring friction.



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