



# MECHANICAL SEALS

**POLSKIE CENTRUM AKREDYTACJI**  
POLISH CENTRE FOR ACCREDITATION

Sygnatariusz EA MLA  
EA MLA Signatory

**CERTYFIKAT AKREDYTACJI**  
**LABORATORIUM BADAWCZEGO**  
ACCREDITATION CERTIFICATE OF TESTING LABORATORY  
**Nr AB 701**

Potwierdza się, że: / This is to confirm that:

**ANGA USZCZELNIENIA MECHANICZNE Sp. z o.o.**  
LABORATORIUM BADAWCZE  
ul. Wyzwolenia 550, 43-340 Kozy

spełnia wymagania normy PN-EN ISO/IEC 17025:2005  
meets requirements of the PN-EN ISO/IEC 17025:2005 standard

Akredytowana działalność jest określona w Zakresie Akredytacji Nr AB 701  
Accredited activity is defined in the Scope of Accreditation No AB 701

Akredytacja pozostaje w mocy pod warunkiem przestrzegania wymagań jednostki akredytującej określonych w kontrakcie Nr AB 701  
This accreditation remains in force provided the Laboratory observes the requirements of Accreditation Body defined in the Contract No AB 701

Certyfikat akredytacji ważny do dnia 04.04.2018 r.  
The certificate of accreditation is valid until 04.04.2018

Akredytacji udzielono dnia 05.04.2006 r.  
Accreditation was granted on 05.04.2006

ZASTĘPCA DYREKTORA  
POLSKIEGO CENTRUM AKREDYTACJI  
*Lucyna Olborska*  
LUCYNA OLBORSKA

Warszawa, dnia 1 kwietnia 2014 roku

**BUREAU VERITAS**  
Certification

Certification  
Awarded To  
**ANGA USZCZELNIENIA MECHANICZNE Sp. zo.o.**  
UL. WYZWOLENIA 550  
43-340 KOZY, POLAND

Bureau Veritas Certification North America, Inc. certifies that the management system of the above organization has been audited and found to be in accordance with the requirements of the management system standards and scope of supply detailed below

STANDARDS

**ISO 9001:2008 AND AS 9100 C**  
IN ACCORDANCE WITH AS9104/1 Issue 2012-01  
Bureau Veritas Certification North America, Inc. is accredited under the  
LA Q.G. ICOP Scheme.  
Certification Structure: Single Site  
SCOPE OF SUPPLY

**MACHINING AND PRODUCTION OF PARTS FOR THE AEROSPACE INDUSTRY**

Original Approval Date: **23 March 2011**

Subject to the continued satisfactory operation of the Organization's Management System, this certificate will remain valid until: **21 March 2017**  
Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization.

Certificate No.: **271824**  
Issue Date: **22 March 2014**

*Angela W. ...*  
Certification Authority

Local office: Bureau Veritas Certification North America, Inc.  
290 Bonner Drive, Houston, Texas, USA  
www.bv.com/certification/na

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization. To check this certificate validity please call + (800) 537-9311.

**CERTIFICATE**

**ISO 14001:2004**

DEKRA Certification Sp. z o.o. hereby certifies that the company

**ANGA Uszczelnienia Mechaniczne Sp. z o.o.**

Scope of certification:  
Design, production, tests, sale and service of mechanical seals

Certified location:  
ul. Wyzwolenia 550 + PL – 43-340 Kozy

has established and maintains an environmental management system according to the above mentioned standard. The conformity was adduced with audit report no. W-A 377011/B2/P/14001.

This certificate is valid from 2014-05-27 to 2017-05-26 Certificate registration no.: 440511037/1 Duplicate

DEKRA Certification Sp. z o.o.  
Wrocław, 2014-04-30

Lack of fulfillment on conditions as set out in the Certification Agreement may render this certificate invalid.  
DEKRA Certification GmbH • Handwerkerstraße 15 • D-70565 Stuttgart • www.dekra-certification.com

page 1 of 1

**CERTIFICATE**

**ISO 9001:2008**

DEKRA Certification Sp. z o.o. hereby certifies that the company

**ANGA Uszczelnienia Mechaniczne Sp. z o.o.**

Scope of certification:  
Design, production, tests, sale and service of mechanical seals

Certified location:  
ul. Wyzwolenia 550 + PL – 43-340 Kozy

has established and maintains a quality management system according to the above mentioned standard. The conformity was adduced with audit report no. W-A 377011/B2/P/9001

This certificate is valid from 2014-05-27 to 2017-05-26 Certificate registration no.: 320311015/2 Duplicate

DEKRA Certification Sp. z o.o.  
Wrocław, 2014-04-30

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Dear Sir or Madam,

We would like to present the catalogue of mechanical seals of ANGA, in which we introduce our standard products and the selection of customized products. We provide the basic information needed for correct mechanical seal selection. The selection is based upon the sealed medium, operating conditions and the kind of equipment in which a given seal has to be assembled.

This catalogue may be useful to end users, designers and maintenance staff of companies manufacturing and operating pumps, mixers, agitators, reactors, high rotational speed gears, fans and other machines with rotating shafts which require efficient and reliable mechanical seals.

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### \* NOTE:

ANGA can guarantee the quality of its products only after a detailed analysis of the operating conditions in which our products will operate. Therefore, in any case, we recommend that you should contact our specialists who will confirm the possibility of using the ANGA product in each case.

In particular, it should be noted that due to interaction, the extreme values of individual operating parameters cannot be applied at the same time. In addition, the working conditions of particular products depend on the materials used, the characteristics of operation of the device, the diameter of the shaft and characteristics of the sealed medium.

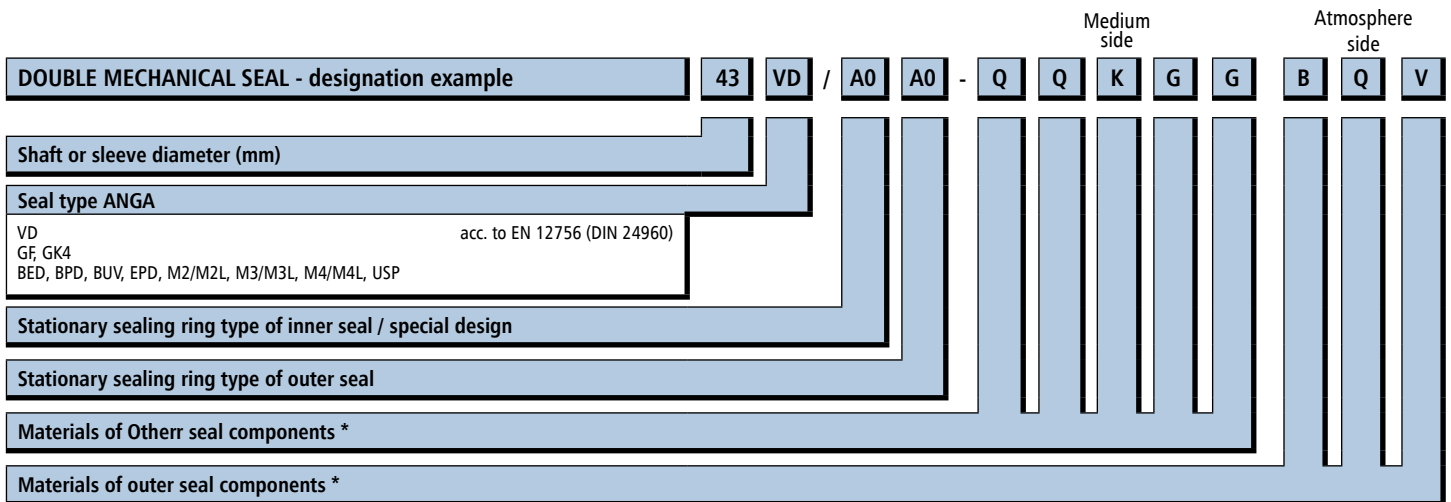
All technical data shown in this catalog are based on experiences and researches conducted by our company. However, mechanical seals can be used in many different conditions, which means that the catalog data are given only for informative purposes.

This document has both informal and practical character. As in any case of this kind, a seal user can use his knowledge and experience for the seal selection. However, in case of any doubts, ANGA Uszczelnienia Mechaniczne Sp. z o.o. (ANGA) provides information and advice, especially if operating conditions of the seal are dangerous for the personnel and the environment.

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SINGLE MECHANICAL SEAL - designation example	70	US2	/	A0	-	A	Q	V	M	G
<b>Shaft or sleeve diameter (mm)</b>										
<b>Seal type ANGA</b>										
A4, A3L/R, V, VT, VS, VB, VBT, US, US2, E1 acc. to EN 12756 (DIN 24960)										
A1, A41, A1G, A10, A11, A12, A13, B12, E2, W, VSK										
BE2, BC, BD, BEQ, BP, BU, EP, M1, M1L, MDZ, MS, USC, UST, USS										
<b>Stationary sealing ring type / special design</b>										
1. For standard seals, type of stationary ring: A0, A5, E5, B0, acc. to EN 12756 (DIN 24960) E0, D0, F0, H0, H5										
2. Number of special design for specific dimension: 01, 02, 03,...										
<b>Rotating sealing ring material</b>										
<b>Stationary sealing ring material</b>										
A – Antimony impregnated carbon graphite										
A1 – Antimony impregnated carbon graphite, resistant to blistering										
A3 – Antimony impregnated carbon graphite, dry-running										
B – Resin impregnated carbon graphite										
B6 – Resin impregnated carbon graphite, FDA certified										
B8 – Resin impregnated carbon graphite, dry-running, FDA certified										
C6 – Electrographite, resistant to blistering, FDA certified										
Q – Sintered silicon carbide (SiC)										
Q1 – Reaction bonded silicon carbide (SiC-Si)										
Q5 – Silicon carbide, diamond coated										
R – CrNi cast iron										
S – Special cast CrMo-steel (1.4136)										
U – Tungsten carbide (Co-bonded)										
U1 – Tungsten carbide (Ni-bonded)										
U2 – Tungsten carbide (Co-bonded)										
V – Al-Oxide ceramic (Al <sub>2</sub> O <sub>3</sub> ; 99.5%)										
V1 – Al-Oxide ceramic (Al <sub>2</sub> O <sub>3</sub> ; 96.0%)										
Y – Glass filled PTFE										
<b>Secondary, flexible seal material</b>										
E – Ethylene-propylene elastomer (EPDM)										
E3 – Ethylene-propylene elastomer, FDA certified										
E4 – Ethylene-propylene elastomer, for hot water, FDA cert										
K – Perfluorocarbon elastomer (FFKM)										
K9 – Perfluorocarbon elastomer, FDA certified										
N – Chloroprene elastomer (CR)										
P – Nitrile elastomer (NBR)										
P3 – Nitrile elastomer, FDA certified										
S – Silicone elastomer (MVQ)										
V – Fluorocarbon elastomer (FKM)										
V3 – Fluorocarbon elastomer, FDA certified										
M – Fluorocarbon elastomer + PTFE-encapsulated (FKM/PTFE)										
G – Graphite										
T – PTFE Teflon® (PTFE)										
<b>Spring material</b>										
G – Stainless steel (1.4310)										
M – Hastelloy® C-4 (2.4610)										
<b>Material of other elements</b>										
F – Stainless steel (1.4541)										
G – Stainless steel (1.4571)										
G1 – Stainless steel URANUS® (1.4539)										
G2 – Stainless steel „Duplex“ (1.4462)										
G4 – Stainless steel „Super Duplex“ (1.4410)										
M – Hastelloy® C-4 (2.4610)										
M1 – Monel® (2.4360)										
T2 – Titanium (3.7035)										

## Types, Materials, Designation – continued



\* Materials of double mechanical seals are indicated in sequence as for single mechanical seals.

Copyright trade names marked above with the ® symbol are held respectively by:

Teflon® – by E. I. du Pont de Nemours and Company,

Hastelloy® – by Haynes International, Inc.

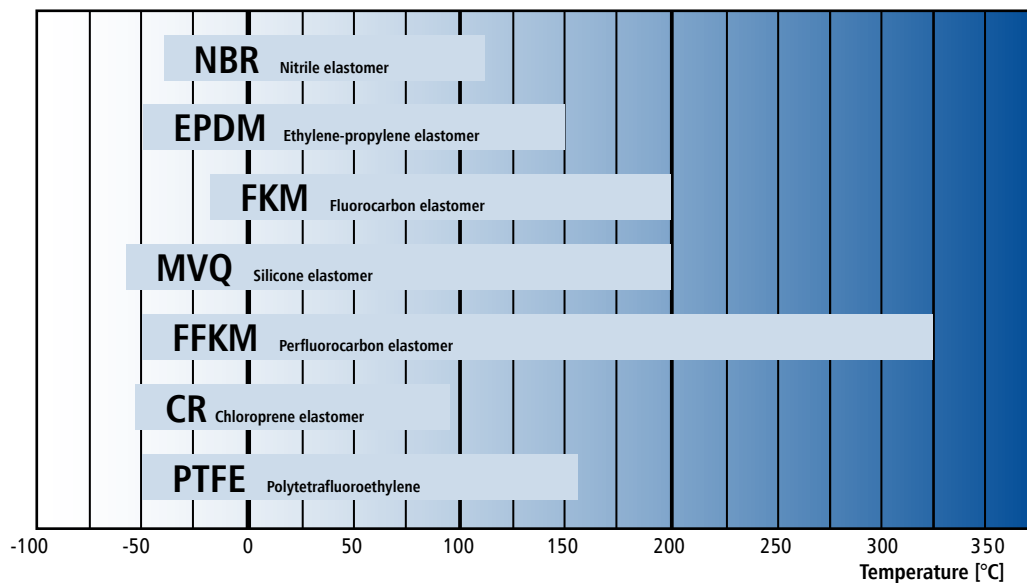
Monel® – by Special Metals Corporation.

AM 350® – by Allegheny Technologies Inc. (ATI)

Uranus® – by ArcelorMittal S.A.

Carpenter® – by Carpenter Technology Corp.

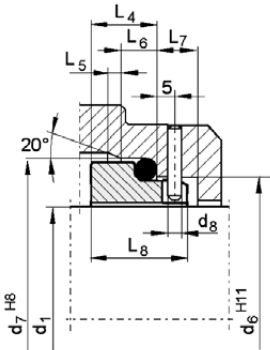
## Thermal resistance of elastomers



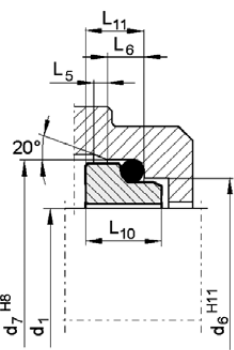
Note: This chart presents extreme values of thermal resistance of elastomers.  
In case of really extreme or non-standard situations please contact ANGA.

# Dimensions of stationary rings

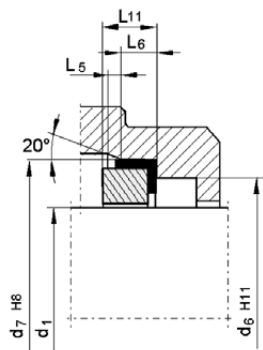
**A0** EN 12756  
(DIN 24960)



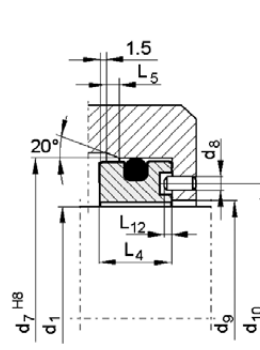
**A5** EN 12756  
(DIN 24960)



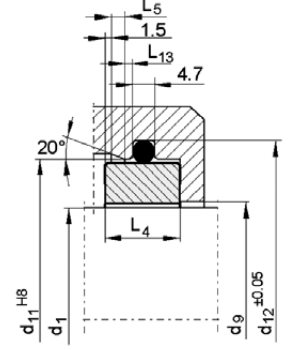
**E5** EN 12756  
(DIN 24960)



**B0** EN 12756  
(DIN 24960)



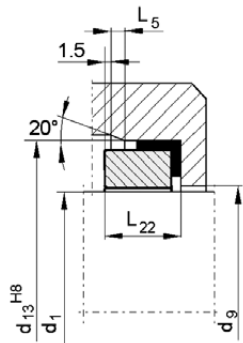
**D0**



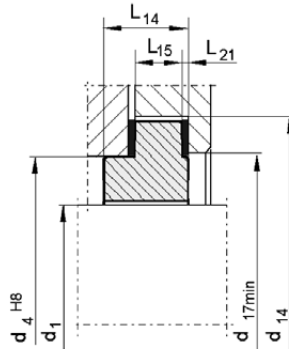
d1	d4	d6	d7	d8	d9	d10	d11	d12	L4	L5	L6	L7	L8	L10	L11	L12	L13
10	22	17	21	3.0	11.0	16.0	21.2	26.8	10.0	1.5	4.0	8.5	16.0	9.0	6.5	1.5	2.0
12	24	19	23	3.0	13.0	18.0	24.2	29.8	10.0	1.5	4.0	8.5	16.0	9.0	6.5	1.5	2.0
14	26	21	25	3.0	15.0	20.0	26.2	31.8	10.0	1.5	4.0	8.5	16.0	9.0	6.5	1.5	2.0
16	28	23	27	3.0	17.0	22.0	27.2	32.8	10.0	1.5	4.0	8.5	16.0	9.0	6.5	1.5	2.0
18	34	27	33	3.0	19.0	25.0	33.2	38.8	11.5	2.0	5.0	9.0	18.0	10.0	7.5	1.5	2.5
20	36	29	35	3.0	21.0	27.0	35.2	40.8	11.5	2.0	5.0	9.0	18.0	10.0	7.5	1.5	2.5
22	38	31	37	3.0	23.0	29.0	37.2	42.8	11.5	2.0	5.0	9.0	18.0	10.0	7.5	1.5	2.5
24	40	33	39	3.0	25.0	31.0	40.2	45.8	11.5	2.0	5.0	9.0	18.0	10.0	7.5	1.5	2.5
25	41	34	40	3.0	26.0	32.0	40.2	45.8	11.5	2.0	5.0	9.0	18.0	10.0	7.5	1.5	2.5
28	44	37	43	3.0	29.0	36.0	43.2	48.8	11.5	2.0	5.0	9.0	18.0	11.0	8.5	2.0	2.5
30	46	39	45	3.0	31.5	38.0	45.2	50.8	11.5	2.0	5.0	9.0	18.0	11.0	8.5	2.0	2.5
32	48	42	48	3.0	33.5	40.5	48.2	53.8	11.5	2.0	5.0	9.0	18.0	11.0	8.5	2.0	2.5
33	49	42	48	3.0	34.5	41.0	48.2	53.8	11.5	2.0	5.0	9.0	18.0	11.0	8.5	2.0	2.5
35	51	44	50	3.0	36.5	43.0	50.2	55.8	11.5	2.0	5.0	9.0	18.0	11.0	8.5	2.0	2.5
38	58	49	56	4.0	39.5	47.0	56.2	61.8	14.0	2.0	6.0	9.0	20.5	11.0	8.5	2.0	3.0
40	60	51	58	4.0	41.5	49.0	58.2	63.8	14.0	2.0	6.0	9.0	20.5	11.0	8.5	2.0	3.0
43	63	54	61	4.0	44.5	52.5	61.2	66.8	14.0	2.0	6.0	9.0	20.5	11.0	8.5	2.0	3.0
45	65	56	63	4.0	46.5	54.0	63.2	68.8	14.0	2.0	6.0	9.0	20.5	11.0	8.5	2.0	3.0
48	68	59	66	4.0	49.5	57.0	66.2	71.8	14.0	2.0	6.0	9.0	20.5	11.0	8.5	2.0	3.0
50	70	62	70	4.0	52.0	60.0	70.2	75.8	15.0	2.5	6.0	9.0	21.5	14.0	11.0	2.5	3.5
53	73	65	73	4.0	55.0	63.5	73.2	78.8	15.0	2.5	6.0	9.0	21.5	14.0	11.0	2.5	3.5
55	75	67	75	4.0	57.0	65.5	75.2	80.8	15.0	2.5	6.0	9.0	21.5	14.0	11.0	2.5	3.5
58	83	70	78	4.0	60.0	67.5	78.2	83.8	15.0	2.5	6.0	9.0	21.5	14.0	11.0	2.5	3.5
60	85	72	80	4.0	62.0	70.0	82.2	87.8	15.0	2.5	6.0	9.0	21.5	14.0	11.0	2.5	3.5
63	88	75	83	4.0	65.0	73.0	85.2	90.8	15.0	2.5	6.0	9.0	21.5	14.0	11.0	2.5	3.5
65	90	77	85	4.0	67.0	76.0	95.2	90.8	15.0	2.5	6.0	9.0	21.5	14.0	11.0	2.5	3.5
68	93	81	90	4.0	70.0	80.0	92.2	97.8	15.0	2.5	7.0	9.0	21.5	14.0	11.0	2.5	3.5
70	95	83	92	4.0	72.0	82.0	92.2	97.8	17.0	2.5	7.0	9.0	23.0	14.0	11.0	2.5	4.0
75	104	88	97	4.0	77.0	87.0	98.2	103.8	17.0	2.5	7.0	9.0	23.0	14.0	11.0	2.5	4.0
80	109	95	105	4.0	82.0	93.5	108.2	113.8	17.0	3.0	7.0	9.0	23.2	17.0	14.0	3.0	4.0
85	114	100	110	4.0	87.0	98.5	111.2	116.8	17.0	3.0	7.0	9.0	23.2	17.0	14.0	3.0	4.0
90	119	105	115	4.0	92.0	103.5	117.2	122.8	17.0	3.0	7.0	9.0	23.2	17.0	14.0	3.0	4.0
95	124	110	120	4.0	97.0	108.5	120.2	125.8	17.0	3.0	7.0	9.0	23.2	17.0	14.0	3.0	4.0
100	129	115	125	4.0	102.0	113.5	127.2	132.8	17.0	3.0	7.0	9.0	23.2	17.0	14.0	3.0	4.0

ANGA can offer and deliver other stationary rings according either to specific individual requirements of customers or to specific pump design and operating conditions.

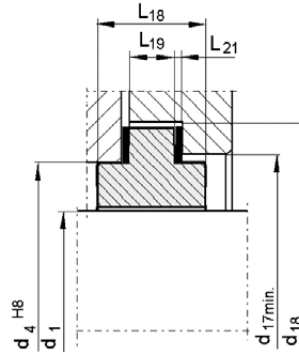
**E0**



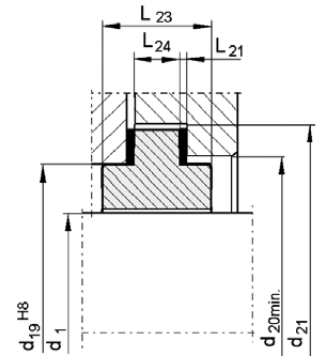
**F0**



**H0**



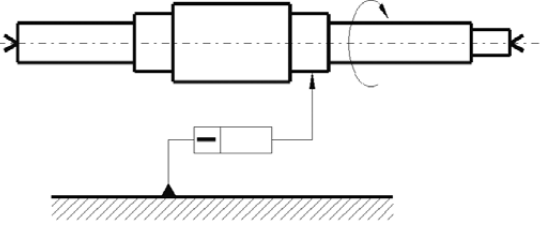
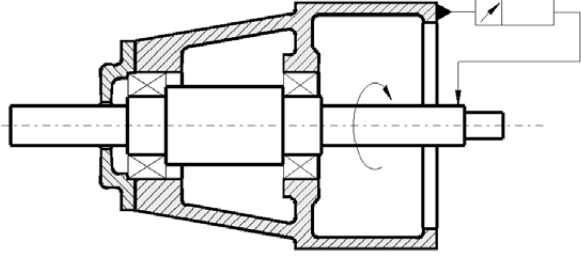
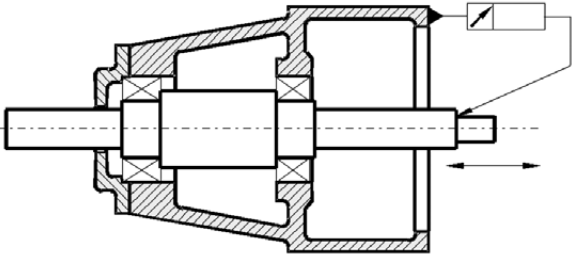
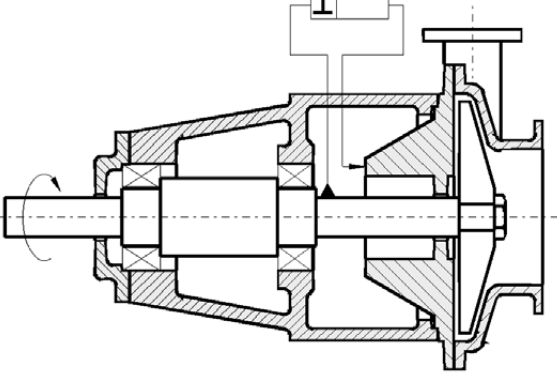
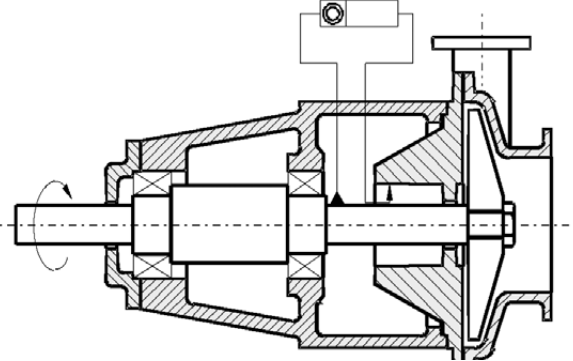
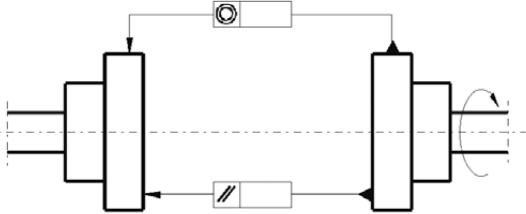
**H5**



d1	d4	d9	d13	d14	d17	d18	d19	d20	d21	L5	L14	L15	L18	L21	L22	L23	L24
10	22	11.0	24	38.0	23.0	38	-	-	-	1.5	17	9.5	18	1.0	8.5	-	-
12	24	13.0	26	40.0	25.0	40	-	-	-	1.5	17	9.5	18	1.0	8.5	-	-
14	26	15.0	28	42.0	27.0	42	-	-	-	1.5	17	9.5	18	1.0	8.5	-	-
16	28	17.0	32	44.0	29.0	44	36.6	37.5	48	1.5	17	9.5	18	1.0	8.5	17.6	8.0
18	34	19.0	35	47.0	35.0	47	36.6	37.5	48	2.0	17	9.5	18	1.0	9.5	17.6	8.0
20	36	21.0	38	49.0	37.5	49	39.7	40.5	51	2.0	17	9.5	18	1.0	9.5	17.6	8.0
22	38	23.0	38	51.0	39.5	51	39.7	40.5	51	2.0	17	9.5	18	1.0	9.5	17.6	8.0
24	40	25.0	42	54.0	41.5	54	42.9	43.5	54	2.0	17	9.5	18	1.0	9.5	17.6	8.0
25	41	26.0	42	54.0	42.5	54	42.9	43.5	54	2.0	17	9.5	26	1.5	9.5	17.6	8.0
28	44	29.0	46	58.0	45.5	58	50.8	51.5	65	2.0	17	9.5	26	1.5	9.5	27.0	11.0
30	46	31.5	48	61.0	47.5	61	54.0	55.0	68	2.0	17	9.5	26	1.5	9.5	27.0	11.0
32	48	33.5	54	61.0	49.5	65	54.0	55.0	68	2.0	17	9.5	26	1.5	9.5	27.0	11.0
33	49	34.5	54	61.0	50.5	65	57.2	58.0	71	2.0	17	9.5	26	1.5	9.5	27.0	11.0
35	51	36.5	54	62.5	52.5	68	57.2	58.0	71	2.0	17	9.5	26	1.5	9.5	27.0	11.0
38	58	39.5	57	70.5	59.5	71	63.5	64.5	78	2.0	17	9.5	26	1.5	12.0	27.0	11.0
40	60	41.5	60	73.5	62.0	75	66.7	67.5	81	2.0	17	9.5	26	1.5	12.0	27.0	11.0
43	63	44.5	64	80.0	65.0	79	69.9	71.0	84	2.0	17	9.5	26	1.5	12.0	27.0	11.0
45	65	46.5	64	80.0	67.0	81	69.9	71.0	84	2.0	17	9.5	26	1.5	12.0	27.0	11.0
48	68	49.5	66	83.0	70.0	84	79.4	80.0	97	2.0	17	9.5	26	1.5	12.0	33.3	14.3
50	70	52.0	70	83.0	72.0	86	79.4	80.0	97	2.5	17	9.5	26	1.5	12.5	33.3	14.3
53	73	55.0	73	89.5	75.0	96	82.6	83.5	100	2.5	17	9.5	32	2.0	12.5	33.3	14.3
55	75	57.0	75	96.0	77.0	98	85.8	86.5	103	2.5	17	9.5	32	2.0	12.5	33.3	14.3
58	83	60.0	80	98.0	85.0	101	88.9	89.5	106	2.5	17	9.5	32	2.0	12.5	33.3	14.3
60	85	62.0	80	100.0	87.0	103	88.9	89.5	106	2.5	20	12.5	32	2.0	12.5	33.3	14.3
63	88	65.0	82	103.0	90.0	106	92.1	93.0	110	2.5	20	12.5	32	2.0	12.5	33.3	14.3
65	90	67.0	90	109.0	92.0	108	95.3	96.0	113	2.5	20	12.5	32	2.0	12.5	33.3	14.3
68	93	70.0	90	112.5	95.0	111	98.5	99.0	116	2.5	20	12.5	32	2.0	12.5	33.3	14.3
70	95	72.0	95	112.5	97.0	113	98.5	99.0	116	2.5	25	17.5	32	2.0	14.5	33.3	14.3
75	104	77.0	100	117.5	107.0	117	103.2	104.0	121	2.5	25	17.5	32	2.0	14.5	34.3	14.3
80	109	82.0	105	125.5	112.0	122	114.3	115.0	132	3.0	25	17.5	32	2.0	16.0	34.3	14.3
85	114	87.0	110	128.5	117.0	128	120.7	121.5	138	3.0	25	17.5	32	2.0	16.0	34.3	14.3
90	119	92.0	115	135.0	122.0	133	127.0	128.0	144	3.0	25	17.5	32	2.0	16.0	34.3	14.3
95	124	97.0	120	138.0	127.0	138	127.0	128.0	144	3.0	25	17.5	32	2.0	16.0	34.3	14.3
100	129	102.0	120	144.5	132.0	143	133.4	134.0	151	3.0	25	17.5	32	2.0	16.0	34.3	14.3

# Allowed tolerances of the pump's shaft

The specifications and values given below are maximum ones. Should these be exceeded malfunction or even destruction of the seals will be inevitable and in such cases ANGA Uszczelnienia Mechaniczne Sp. z o.o. cannot be held responsible.

<p>1. Shaft rectilinearity must not exceed: for d - 50 mm: max 0.03 mm for d &gt; 50 mm: max 0.05 mm</p>	<p>4. Shaft runout in place where the mechanical seal is to be installed must not exceed: for d - 50 mm: max 0.05 mm for d &gt; 50 mm: max 0.08 mm</p>
	
<p>2. Axial shaft bearing clearance must not exceed max 0.05 mm</p>	<p>5. Squareness of the seal chamber face to the axis of the shaft must not exceed: for n = 3000 rpm: max 0.025 mm for n = 1500 rpm: max 0.08 mm</p>
	
<p>3. Concentricity tolerance of the seal chamber in relation to the shaft must not exceed 0.15 mm max If using a mechanical seal with pumping screw, the allowed tolerance must not exceed 0.1 mm max</p>	<p>6. Coupling alignment must not exceed: max 0.08 mm</p>
	



In order to provide you with the best selection of both seal design and its material specification for your specific working conditions, we would like to ask you to fill in the following form according to your best knowledge and in case of any doubts or questions please contact us.

Thank You,

ANGA Uszczelnienia Mechaniczne Sp. z o.o.

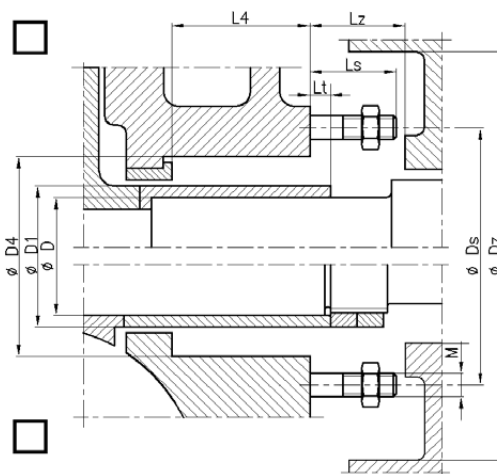
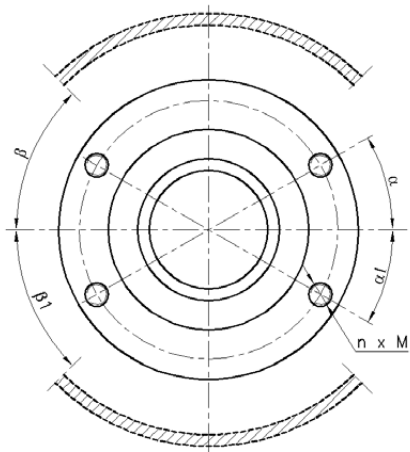
1. USER DATA							
Name of company / address:							
Process number of the device:				Name of the production department:			
Name of the contact person:				Phone:		E-mail:	
2. SEALED FLUID DATA							
Type (description, formula):							
Sealed pressure [MPa]:	Min.	Norm.	Max.	Density at $T_{oper}$ [g/cm <sup>3</sup> ]:		Vapor pressure at $T_{oper}$ [MPa]:	
Operation temperature [°C]:	Min.	Norm.	Max.	Viscosity at $T_{oper}$ [mm <sup>2</sup> /s]:	pH value:	Min.	Max.
Melting temperature [°C]:	Ignition temperature [°C]:		Flash point [°C]:		Name of acceptable barrier / buffer fluid:		
Chemically aggressive: <input type="checkbox"/> yes <input type="checkbox"/> no		Abrasives: <input type="checkbox"/> yes, content %: _____ <input type="checkbox"/> no		Characteristic changes during process: <input type="checkbox"/> yes (describe it below) <input type="checkbox"/> no		There is a need of: <input type="checkbox"/> heating <input type="checkbox"/> cooling	
Notes (additional requirements, health and environmental risks, changes of sealed fluid characteristic during process or machine downtime etc.):							
3. EQUIPMENT DATA							
Manufacturer:				Type (name, code):			
Type of equipment: <input type="checkbox"/> pump <input type="checkbox"/> mixer <input type="checkbox"/> other (what?):	Shaft's location: <input type="checkbox"/> vertical <input type="checkbox"/> horizontal <input type="checkbox"/> diagonal		Direction of rotation: <input type="checkbox"/> right <input type="checkbox"/> left <input type="checkbox"/> changeable		Mode of operation: <input type="checkbox"/> continuous <input type="checkbox"/> periodical (describe it below)		Location: <input type="checkbox"/> indoor <input type="checkbox"/> outdoor <input type="checkbox"/> portable
Suction pressure [MPa]:		Discharge pressure [MPa]:		Rotation speed [1/min]:		Quantity of seals in equipment:	
Current mechanical seal:			Current plan acc. to ISO 21049 (API 682):		Current durability of mechanical seals [h]:		
Dry-running? <input type="checkbox"/> yes <input type="checkbox"/> no		Stop in „hot reserve“: <input type="checkbox"/> yes <input type="checkbox"/> no		Rapid changes in pressure: <input type="checkbox"/> yes <input type="checkbox"/> no		Rapid changes in temperature: <input type="checkbox"/> yes <input type="checkbox"/> no	
4. EXPECTED SOLUTION:							
Manufacturer:				Type (name, code):			
Suggested mechanical seal:		<input type="checkbox"/> component <input type="checkbox"/> cartridge		<input type="checkbox"/> single <input type="checkbox"/> double		Suggested plan acc. to ISO 21049 (API 682):	
Expected durability of mechanical seals [h]:							
Required elements of auxiliary installation: <input type="checkbox"/> Temperature gauge <input type="checkbox"/> Pressure gauge			<input type="checkbox"/> Liquid level indicator <input type="checkbox"/> Hand pump			<input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____	
Required documents: <input type="checkbox"/> ISO certificates <input type="checkbox"/> Quality control certificates			<input type="checkbox"/> Certificate of compliance <input type="checkbox"/> ATEX declaration of conformity <input type="checkbox"/> FDA declaration of conformity			Required guarantee: <input type="checkbox"/> 12 months <input type="checkbox"/> Other (months) _____	
Other (additional requirements, required tests and documents, etc.):							

# Installation dimensions of mechanical seals



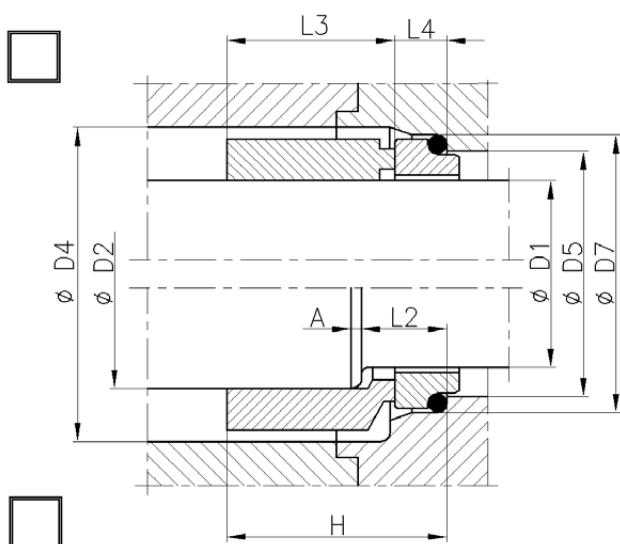
Please tick the box next to the proper type of your installation and indicate required dimensions.  
If some important dimensions are not marked on the drawings, please draw them and enter values.

## 5. STUFFING BOX (PUMP SEALING CHAMBER):



D	D1	D4	D5	DM	DZ	L4	LZ	LT	LW	LS	M	N	$\alpha$	$\alpha 1$	$\beta$	$\beta 1$

## 6. COMPONENT MECHANICAL SEAL



D1	D2	D4	D5	D7	L2	L3	L4	A

## 7. OTHER SOLUTION

Please attach a description, sketches, drawings, photos, etc.



**ANGA USZCZELNIENIA MECHANICZNE Sp. z o.o.**

43-340 KOZY, ul. Wyzwolenia 550, POLAND

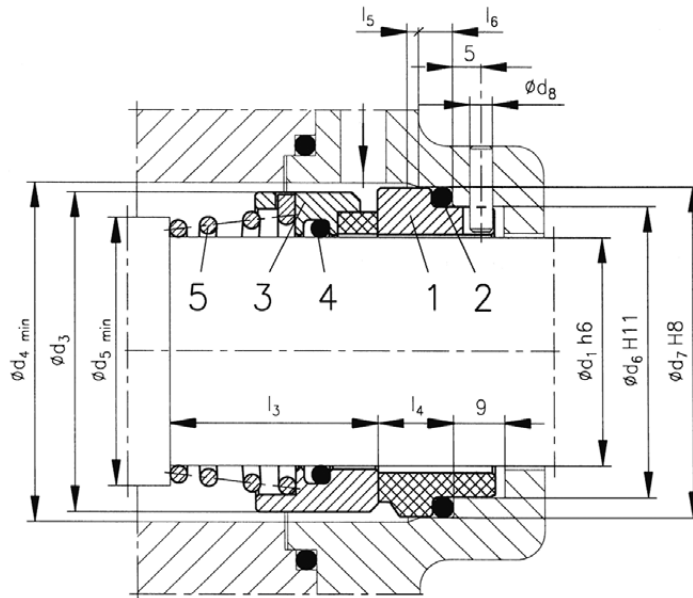
tel. +48 33 827-80-00, fax +48 33 827-80-11

e-mail: [anga@anga.com.pl](mailto:anga@anga.com.pl) [www.anga.com.pl](http://www.anga.com.pl)

- Single mechanical seal
- Unbalanced
- Dependent of the direction of shaft rotation
- With central tapered spring

Operating limits*		
Pressure	$P_{max}$	1.0 MPa
Temperature	$t_{max}$	200 °C
Speed	$V_{max}$	20 m/s

\* - see note on page 3.



## Legend

- |                    |           |
|--------------------|-----------|
| 1. Stationary ring | 4. O-ring |
| 2. O-ring          | 5. Spring |
| 3. Rotating ring   |           |

## Application

General purpose mechanical seal for use in centrifugal pumps and other equipment with rotating shaft handling water, oils, fuels, mild chemicals and liquids containing low quantity of abrasives.

## Note

Type A3 seal with conical spring is dependent on the direction of the shaft rotation. Looking at the sliding face of the rotating seal ring, a righthanded shaft rotation needs a right handed spring (A3R - clockwise) and vice-versa (A3L - anticlockwise).

## Materials

Part	Code
Rotating ring	A, B, U, Q
Stationary ring	A, B, U2, Q, V, S
Secondary, flexible seals	E, P, V
Spring	G
Other metal parts	F, G

## Dimensions (mm)

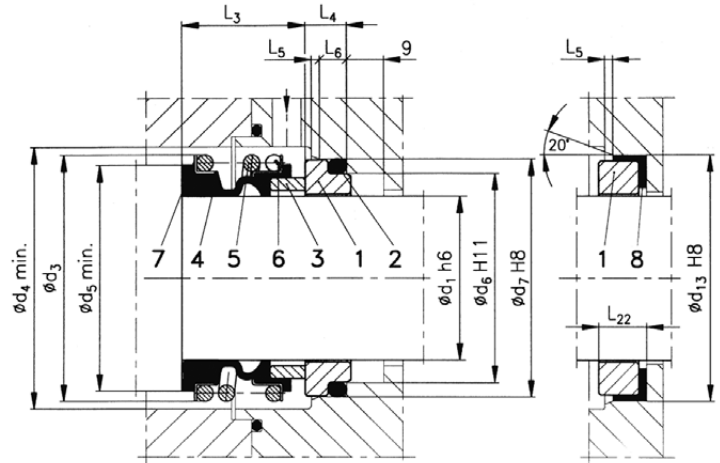
D1	D3	D4	D5	D6	D7	D8	L3*	L4	L5	L6
12	22	24	15	19	23	3	21,0	10,0	1,5	4
14	24	26	18	21	25	3	24,0	10,0	1,5	4
15	27	29	20	22	26	3	25,0	10,0	1,5	4
16	27	29	20	23	27	3	26,0	10,0	1,5	4
18	32	34	22	27	33	3	26,0	11,5	2,0	5
19	32	34	23	28	34	3	26,0	11,5	2,0	5
20	34	36	24	29	35	3	26,0	11,5	2,0	5
22	36	38	27	31	37	3	26,0	11,5	2,0	5
24	38	40	29	33	39	3	28,5	11,5	2,0	5
25	39	41	30	34	40	3	28,5	11,5	2,0	5
28	42	44	33	37	43	3	31,0	11,5	2,0	5
30	44	46	35	39	45	3	31,0	11,5	2,0	5
32	46	48	38	42	48	3	31,0	11,5	2,0	5
33	47	49	39	42	48	3	31,0	11,5	2,0	5
35	49	51	41	44	50	3	31,0	11,5	2,0	5
38	54	58	45	49	56	4	36,5	14,0	2,0	6
40	56	60	47	51	58	4	36,5	14,0	2,0	6
43	59	63	50	54	61	4	39,5	14,0	2,0	6
45	61	65	52	56	63	4	39,5	14,0	2,0	6
48	64	68	55	59	66	4	39,5	14,0	2,0	6
50	66	70	58	62	70	4	40,5	15,0	2,5	6
53	69	73	61	65	73	4	40,5	15,0	2,5	6
55	71	75	64	67	75	4	46,5	15,0	2,5	6
58	78	83	67	70	78	4	49,0	15,0	2,5	6
60	80	85	70	72	80	4	51,0	15,0	2,5	6
63	83	88	73	75	83	4	51,0	15,0	2,5	6
65	85	90	76	77	85	4	55,0	15,0	2,5	6
68	88	93	79	81	90	4	55,0	15,0	2,5	7
70	90	95	81	83	92	4	55,0	17,0	2,5	7
75	99	104	87	88	97	4	58,0	17,0	2,5	7
80	104	109	92	95	105	4	58,0	17,0	3,0	7

\*tolerance of  $L_3$  dimension for  $d_1 = 10 \div 30 \text{ mm} \pm 0.5 \text{ mm}$   
 $d_1 = 32 \div 50 \text{ mm} \pm 0.8 \text{ mm}$   
 $d_1 = 53 \div 100 \text{ mm} \pm 1.0 \text{ mm}$   
 Other dimensions are available as an option. Please contact ANGA.

Operating limits*		
Pressure	$p_{max}$	1.0 MPa
Temperature	$t_{max}$	120 °C
Speed	$v_{max}$	10 m/s

\* - see note on page 3.

- Single mechanical seal
- With rubber bellows
- Unbalanced
- Independent of the direction of shaft rotation
- Central spring



## Dimensions (mm)

D1	D3	D4	D5	D6	D7	D13	L3*	L4	L5	L6	L22
10	22,5	24	20,5	17	21	24	14,5	6,5	1,5	4	8,5
12	24,5	26	22,5	19	23	26	15,0	6,5	1,5	4	8,5
13	28,5	30	26,5	21	25	28	17,0	6,5	1,5	4	8,5
14	28,5	30	26,5	21	25	28	17,0	6,5	1,5	4	8,5
15	28,5	30	26,5	23	26	30	17,0	6,5	1,5	4	8,5
16	28,5	30	26,5	23	27	32	17,0	6,5	1,5	4	8,5
18	32,0	33	29,0	27	33	35	19,5	7,5	2,0	5	9,5
19	35,0	38	31,0	28	34	35	20,0	7,5	2,0	5	9,5
20	36,0	38	33,0	29	35	38	21,5	7,5	2,0	5	9,5
22	36,0	38	33,0	31	37	38	21,5	7,5	2,0	5	9,5
24	41,5	44	38,0	33	39	42	22,5	7,5	2,0	5	9,5
25	41,5	44	38,0	34	40	42	23,0	7,5	2,0	5	9,5
26	41,5	44	38,0	34	40	42	23,0	7,5	2,0	5	9,5
28	47,0	50	43,0	37	43	46	26,5	8,5	2,0	5	9,5
30	47,0	50	44,0	39	45	48	26,5	8,5	2,0	5	9,5
32	50,5	55	46,0	42	48	54	27,5	8,5	2,0	5	9,5
33	50,5	55	46,0	42	48	54	27,5	8,5	2,0	5	9,5
35	55,0	59	50,0	44	50	54	28,5	8,5	2,0	5	9,5
38	58,5	61	53,0	49	56	57	30,0	8,5	2,0	6	12,0
40	60,5	64	55,0	51	58	60	30,0	8,5	2,0	6	12,0
43	63,0	67	58,0	54	61	64	30,0	8,5	2,0	6	12,0
45	68,0	70	60,0	56	63	64	30,0	8,5	2,0	6	12,0
48	71,5	74	63,0	59	66	66	30,5	8,5	2,0	6	12,0
50	72,5	77	65,0	62	70	70	30,5	11,0	2,5	6	12,5
53	78,0	81	70,0	65	73	73	33,0	11,0	2,5	6	12,5
55	78,5	83	72,0	67	75	75	35,0	11,0	2,5	6	12,5
58	83,5	88	75,0	70	78	80	37,0	11,0	2,5	6	12,5
60	86,5	91	79,0	72	80	80	38,0	11,0	2,5	6	12,5
65	93,0	96	84,0	77	85	90	40,0	11,0	2,5	6	12,5
68	96,0	100	88,0	81	90	90	40,0	11,0	2,5	7	12,5
70	98,0	103	90,0	83	92	95	40,0	11,0	2,5	7	14,5
75	103,0	110	95,0	88	97	100	40,0	11,0	2,5	7	14,5
80	110,0	116	100,0	95	105	105	40,0	14,0	3,0	7	16,0
85	116,0	124	107,0	100	110	-	41,0	14,0	3,0	7	16,0
95	132,0	136	119,0	110	120	-	46,0	14,0	3,0	7	16,0
100	137,0	140	124,0	115	125	-	47,0	14,0	3,0	7	16,0

\* tolerance of  $L_3$  dimension for  $d_1 = 10 \div 30 \text{ mm} \pm 0.5 \text{ mm}$   
 $d_1 = 32 \div 50 \text{ mm} \pm 0.8 \text{ mm}$   
 $d_1 = 53 \div 100 \text{ mm} \pm 1.0 \text{ mm}$   
 Other dimensions are available as an option. Please contact ANGA.

## Legend

- |                      |                      |
|----------------------|----------------------|
| 1. Stationary ring   | 5. Spring            |
| 2. O-ring            | 6. Front thrust ring |
| 3. Rotating ring     | 7. Rear thrust ring  |
| 4. Elastomer bellows | 8. L-shaped gasket   |

## Note

There is also A1G version with extended bellows available, adapted to the special conditions of installation.

## Application

General purpose seal for use with water, oils, fuels and liquids containing low quantity of abrasive particles being handled in centrifugal pumps and other equipment actuated by rotating shafts.

## Materials

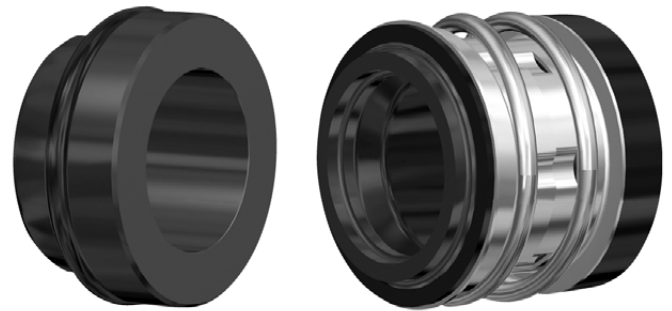
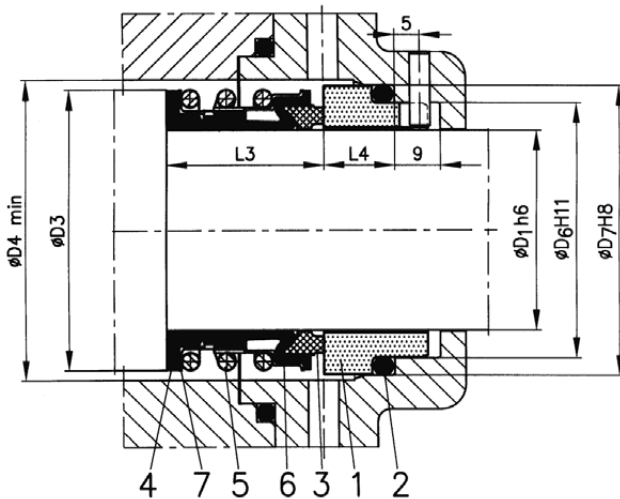
Part	Code
Rotating ring	A, B, U, Q
Stationary ring	U2, Q, V, S
Secondary, flexible seals	E, P, S, V
Spring	G
Other metal parts	F, G

- Single mechanical seal
- Balanced
- Central, non-clogging coil spring
- Dual-direction of shaft rotation
- Elastomer bellows protected against twisting
- Easy and quick installation
- Installation acc. to DIN 24960, EN 12756 and ISO 3069

Operating limits**		
Pressure	$p_{max}$	2.0 MPa *
Temperature	$t_{max}$	150 °C
Speed	$v_{max}$	15 m/s

\* - Maximum pressure depends on the diameter of mechanical seal.

\*\* - see note on page 3.



## Legend

- |                      |                      |
|----------------------|----------------------|
| 1. Stationary ring   | 5. Spring            |
| 2. O-ring            | 6. Front thrust ring |
| 3. Rotating ring     | 7. Rear thrust ring  |
| 4. Elastomer bellows |                      |

## Application

Universal, general purpose mechanical seal for water/water based solutions, oils, fuels and other fluids even with some content of abrasives and it is suitable for various operating conditions. Design intended for centrifugal pumps and other rotary equipment in industrial applications (food processing, water systems, wastewater treatment, petrochemical processing, pulp and paper).

## Note

The A41 version of the A4 seal is available, sized to direct application in the place of A1 seal ( $L_3$  dimension for particular size is the same as for the A1 seal).

## Materials

Part	Code
Rotating ring	A, B, Q
Stationary ring	U2, Q, V, S
Secondary, flexible seals	E, P, V
Spring	G
Other metal parts	F, G

## Dimensions (mm)

D1	D3	D4	D6	D7	L3*	L4
16	26	28	23	27	26,0	10,0
18	32	34	27	33	26,0	11,5
20	34	36	29	35	26,0	11,5
22	36	38	31	37	26,0	11,5
24	38	40	33	39	28,5	11,5
25	39	41	34	40	28,5	11,5
26	40	42	34	40	28,5	11,5
28	42	44	37	43	31,0	11,5
30	44	46	39	45	31,0	11,5
32	46	48	42	48	31,0	11,5
33	47	49	42	48	31,0	11,5
35	49	51	44	50	31,0	11,5
38	54	58	49	56	31,0	14,0
40	56	60	51	58	31,0	14,0
43	59	63	54	61	31,0	14,0
45	61	65	56	63	31,0	14,0
48	64	68	59	66	31,0	14,0
50	66	70	62	70	32,5	15,0
53	69	73	65	73	32,5	15,0
55	71	75	67	75	32,5	15,0
58	78	83	70	78	37,5	15,0
60	80	85	72	80	37,5	15,0
63	83	88	75	83	37,5	15,0
65	85	90	77	85	37,5	15,0
68	88	93	81	90	37,5	15,0
70	90	95	83	92	43,0	17,0
75	99	104	88	97	43,0	17,0
80	104	109	95	105	43,0	17,0

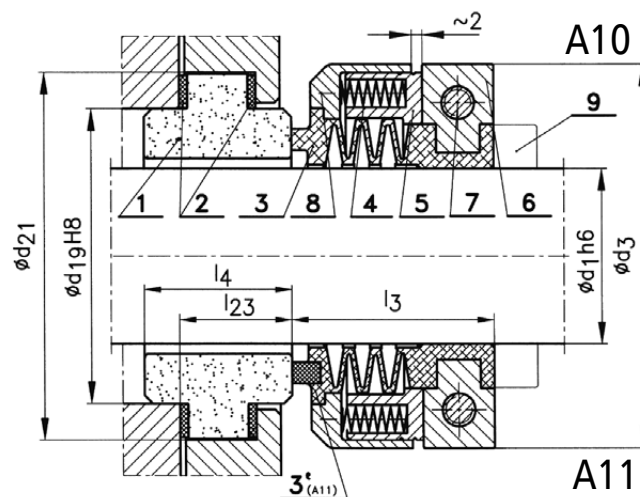
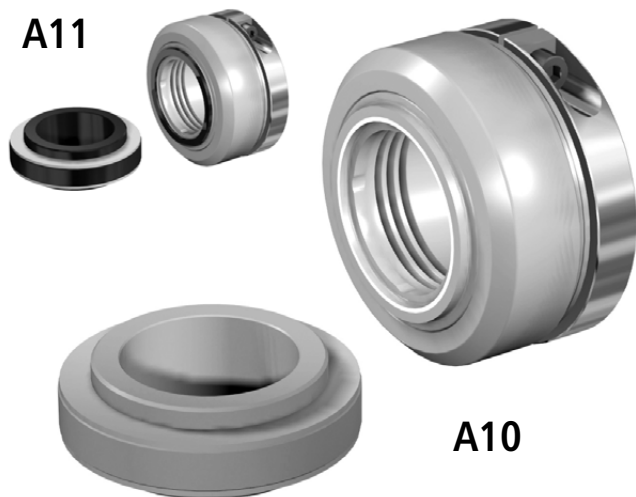
\* tolerance of  $L_3$  dimension for  $d_1 = 10 \div 30 \text{ mm} \pm 0.5 \text{ mm}$   
 $d_1 = 32 \div 80 \text{ mm} \pm 1.0 \text{ mm}$

Other dimensions are available as an option. Please contact ANGA.

Operating limits*		
Pressure	$p_{max}$	0.9 MPa
Temperature	$t_{max}$	120 °C
Speed	$v_{max}$	8 m/s

\* - see note on page 3.

- Single, outside mounted mechanical seal
- With PTFE bellows
- Balanced
- Dual directional
- Multi-spring



## Application

Type A10/A11 mechanical seals are designed for use in extremely corrosive environments (A10 only for non-abrasive applications). All metal components, including springs are isolated from the sealed, aggressive medium.

## Legend

- |                        |                    |
|------------------------|--------------------|
| 1. Stationary ring     | 6. Thrust plate    |
| 2. Flat gasket         | 7. Set screw       |
| 3,3'. Rotating ring ** | 8. Bellows housing |
| 4. Springs             | 9. Thrust ring *   |
| 5. Spring housing      |                    |

\* - It is recommended to block any possible movement of the rotating unit by a thrust ring in case of sealed pressure exceeding 0.4 MPa.

\*\* - version A11 is available with rotating ring with carbon graphite wear resistant insert for abrasive applications.

## Dimensions (mm)

D1	D3	D19	D21	L3	L4	L23
20	57	39,7	51	31	17,6	13,8
22	57	39,7	51	31	17,6	13,8
24	61	42,9	54	33	17,6	13,8
25	61	42,9	54	33	17,6	14,3
28	67	50,8	65	36	27,0	20,5
30	70	54,0	68	37	27,0	20,5
32	70	54,0	68	37	27,0	20,5
33	73	57,2	71	38	27,0	20,5
35	73	57,2	71	38	27,0	20,5
38	76	63,5	78	38	27,0	20,5
40	80	66,7	81	40	27,0	20,5
43	83	69,9	84	40	27,0	20,5
45	83	69,9	84	40	27,0	20,5
48	89	79,4	97	43	33,3	25,3
50	89	79,4	97	43	33,3	25,3
53	103	82,6	100	53	33,3	25,8
55	107	85,8	103	53	33,3	25,8
58	110	88,9	106	53	33,3	25,8
60	110	88,9	106	53	33,3	25,8
63	113	92,1	110	53	33,3	25,8
65	116	95,3	113	53	33,3	25,8
68	118	98,5	116	53	33,3	25,8
70	118	98,5	116	53	33,3	25,8
75	126	103,2	121	53	34,3	26,3
80	150	114,3	132	73	34,3	26,3

Other dimensions are available as an option. Please contact ANGA.

## Note:

Type A10/A11 seals incorporate visual wear indicators of rotating ring (pos. 3,3') in the spring housing (pos. 5):

- green line - means initial seal operating adjustment,
- red line - means that the rotating ring - bellows needs service.

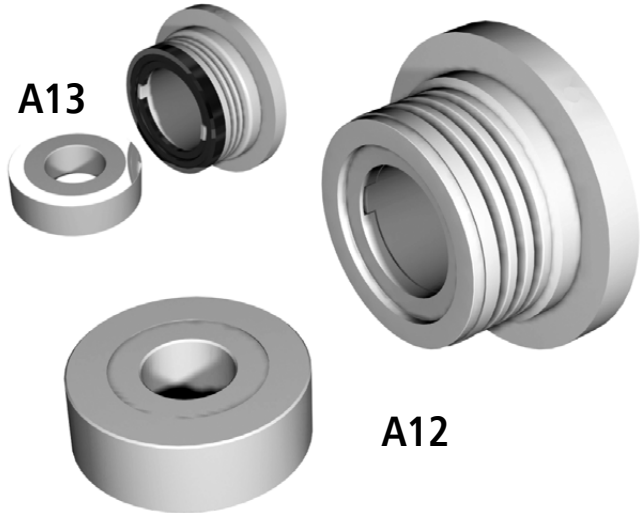
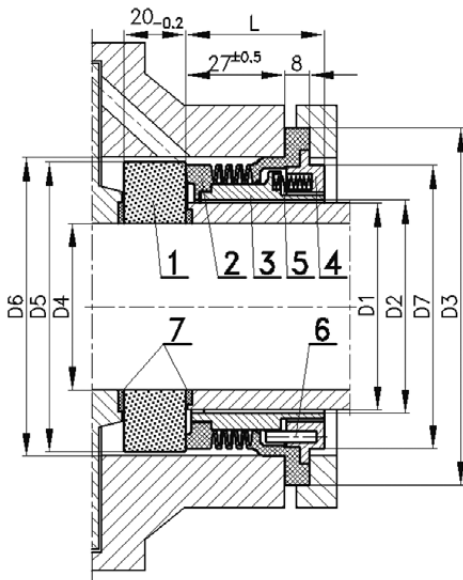
## Materials

Part	Code A10	Code A11
Rotating ring	Y	B, A
Stationary ring	Q, V	
Secondary, flexible seals	T1	
Spring	M	
Other metal parts	G	

- Single mechanical seal
- Balanced
- Outside mounted
- Independent of the direction of shaft rotation
- Multi-spring
- PTFE bellows

Operating limits*		
Pressure	$p_{max}$	1.2 MPa
Temperature	$t_{max}$	80 °C
Speed	$v_{max}$	10 m/s

\* - see note on page 3.



## Legend A12, A13

1. Rotating ring
2. A12/A13 bellows\*
3. Sleeve
4. Cage
5. Springs
6. Driver
7. Flat gaskets

## Legend B12

1. Rotating ring
2. Stationary ring
3. O-ring
4. Seal housing
5. Driver
6. Spring
7. Flat gaskets
8. Flat gasket

\* - The A13 version with carbon insert is available. It is recommended for abrasive media.

## Dimensions (mm)

D1	D2	D3	D4	D5	D6	D7	L
30	32	78	22	56	60,1	54	38
35	37	83	22	56	65,1	60	38
40	42	88	32	66	70,1	65	41
45	47	94	32	70	75,1	70	41
50	52	100	40	76	80,1	75	41
60	62	110	37	86	90,1	85	41
70	72	120	60	97	100,1	95	41
80	82	130	70	107	110,1	105	41

Other dimensions are available as an option. Please contact ANGA.

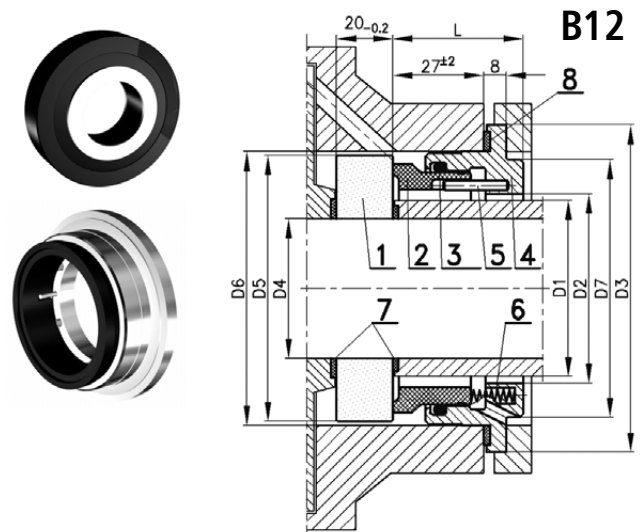
The B12 version is intended for operating with aggressive chemical media of temperature above 80°C.

## Application

The A12, A13 and B12 mechanical seals are intended for operating with extremely aggressive chemical compounds (for the A13 and B12 seals, presence of small abrasive particles is permitted). Mechanical seals are intended for centrifugal pumps and other equipments with rotating shafts.

## Materials

Part	Code A12	Code A13	Code B12
Rotating ring	V, Q		
Stationary ring	Y	B	B, Q
Secondary, flexible seals	T1		T1, V, K, E
Spring	M		
Other metal parts	-		G, T2





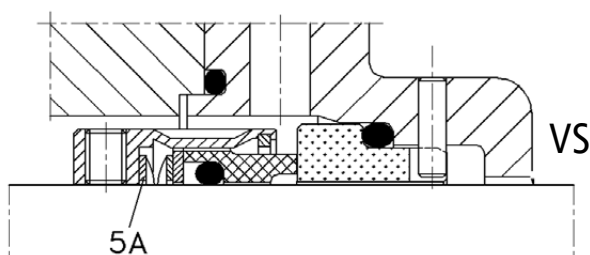
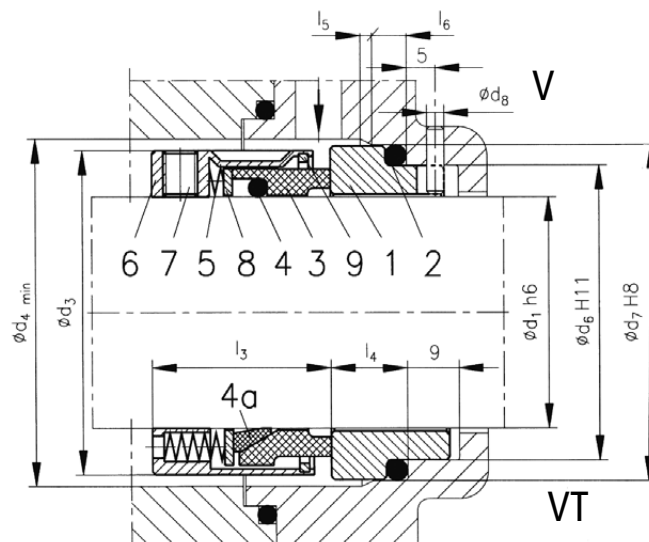
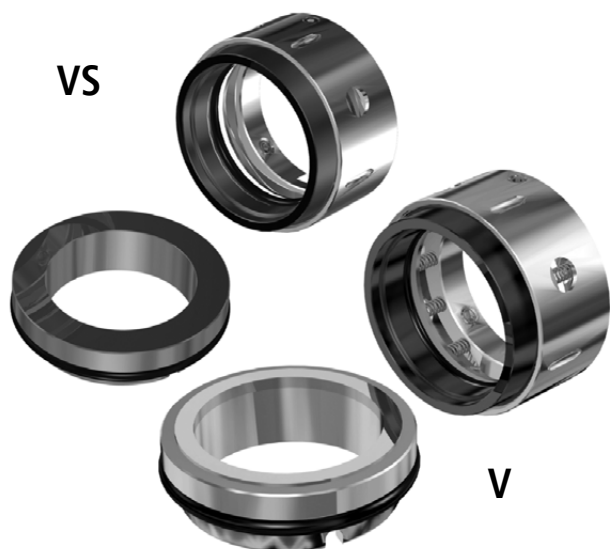




Operating limits*		
Pressure	$p_{max}$	1.0 MPa
Temperature	$t_{max}$	200 °C
Speed	$v_{max}$	20 m/s

\* - see note on page 3.

- Single mechanical seal
- Unbalanced
- Dual directional
- Multi-spring (version V, VT)
- Wave spring (version VS)
- PTFE wedge gasket (version VT)



## Dimensions (mm)

D1	D3	D4	D6	D7	D8	L3*	L4	L5	L6
16	30	33	23	27	3	26,0	10,0	2,0	5
18	32	34	27	33	3	26,0	11,5	2,0	5
20	34	36	29	35	3	26,0	11,5	2,0	5
22	36	38	31	37	3	26,0	11,5	2,0	5
24	38	40	33	39	3	28,5	11,5	2,0	5
25	39	41	34	40	3	28,5	11,5	2,0	5
26	40	42	34	40	3	28,5	11,5	2,0	5
28	42	44	37	43	3	31,0	11,5	2,0	5
30	44	46	39	45	3	31,0	11,5	2,0	5
32	46	48	42	48	3	31,0	11,5	2,0	5
33	47	49	42	48	3	31,0	11,5	2,0	5
35	49	51	44	50	3	31,0	11,5	2,0	5
38	54	58	49	56	4	31,0	14,0	2,0	6
40	56	60	51	58	4	31,0	14,0	2,0	6
43	59	63	54	61	4	31,0	14,0	2,0	6
45	61	65	56	63	4	31,0	14,0	2,0	6
48	64	68	59	66	4	31,0	14,0	2,0	6
50	66	70	62	70	4	32,5	15,0	2,5	6
53	69	73	65	73	4	32,5	15,0	2,5	6
55	71	75	67	75	4	32,5	15,0	2,5	6
58	78	83	70	78	4	37,5	15,0	2,5	6
60	80	85	72	80	4	37,5	15,0	2,5	6
63	83	88	75	83	4	37,5	15,0	2,5	6
65	85	90	77	85	4	37,5	15,0	2,5	6
68	88	93	81	90	4	37,5	15,0	2,5	7
70	90	95	83	92	4	43,0	17,0	2,5	7
75	99	104	88	97	4	43,0	17,0	2,5	7
80	104	109	95	105	4	43,0	17,0	3,0	7
85	109	114	100	110	4	43,0	17,0	3,0	7
90	114	119	105	115	4	48,0	17,0	3,0	7
95	119	124	110	120	4	48,0	17,0	3,0	7
100	124	129	115	125	4	48,0	17,0	3,0	7
105	130	135	120	130	4	48,0	20,0	3,0	7
110	135	140	125	135	4	48,0	20,0	3,0	7
115	140	145	130	140	4	48,0	20,0	3,0	7
120	145	150	135	145	4	48,0	20,0	3,0	7
125	150	155	140	150	4	48,0	20,0	3,0	7

\* tolerance of L<sub>3</sub> dimension is ± 0.5 mm  
Other dimensions are available as an option. Please contact ANGA.

## Legend

- |                                    |                              |
|------------------------------------|------------------------------|
| 1. Stationary ring                 | 5. Springs                   |
| 2. O-ring                          | 5a. Wave spring (version VS) |
| 3. Rotating ring                   | 6. Seal housing              |
| 4. O-ring                          | 7. Set screw                 |
| 4a. PTFE wedge gasket (version VT) | 8. Thrust plate              |
|                                    | 9. Snap spring ring          |

## Application

General purpose seals type V, VS, VT are recommended for clean mediums. They are designed for use with petroleum products, poorly aggressive chemicals, and refrigerants in centrifugal pumps and other equipment with rotating shafts.

## Materials

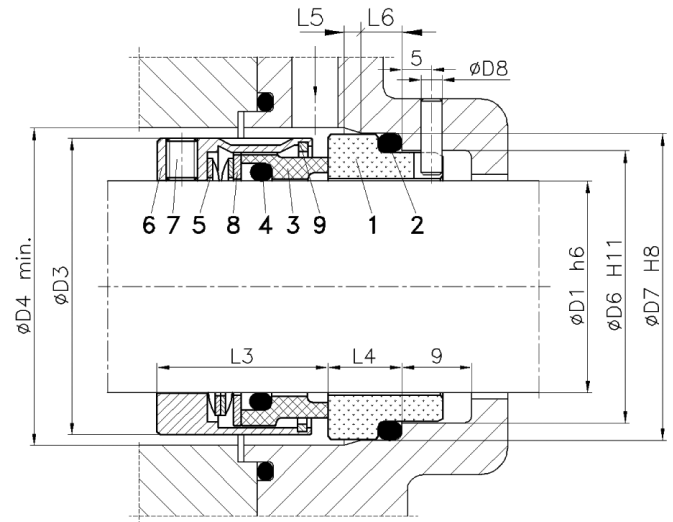
Part	Code
Rotating ring	A, B, Q
Stationary ring	Q, V
Secondary, flexible seals	P, V, E, K
Other metal parts	G, M

- Single mechanical seal
- Unbalanced
- Dual directional
- Wave spring



Operating limits*		
Pressure	$p_{max}$	1.0 MPa
Temperature	$t_{max}$	200 °C
Speed	$v_{max}$	20 m/s

\* - see note on page 3.



## Legend

- |                    |                     |
|--------------------|---------------------|
| 1. Stationary ring | 6. Seal housing     |
| 2. O-ring          | 7. Set screw        |
| 3. Rotating ring   | 8. Thrust plate     |
| 4. O-ring          | 9. Snap spring ring |
| 5. Wave spring     |                     |

## Dimensions (mm)

D1	D3	D4	D6	D7	D8	L3	L4	L5	L6
10	20	22	17	21	3	18	10.0	1.5	4
12	22	24	19	23	3	18	10.0	1.5	4
14	24	26	21	25	3	18	10.0	1.5	4
16	26	28	23	27	3	18	10.0	1.5	4
18	29	34	27	33	3	19	11.5	2.0	5
20	31	36	29	35	3	19	11.5	2.0	5
22	33	38	31	37	3	19	11.5	2.0	5
24	36	40	33	39	3	21	11.5	2.0	5
25	39	41	34	40	3	22	11.5	2.0	5
26	40	42	34	40	3	22	11.5	2.0	5
28	42	44	37	43	3	22	11.5	2.0	5
30	44	46	39	45	3	23	11.5	2.0	5
32	46	48	42	48	3	23	11.5	2.0	5
33	47	49	42	48	3	23	11.5	2.0	5
35	49	51	44	50	3	23	11.5	2.0	5
38	54	58	49	56	4	24	14.0	2.0	6
40	56	60	51	58	4	25	14.0	2.0	6
43	59	63	54	61	4	25	14.0	2.0	6
45	61	65	56	63	4	25	14.0	2.0	6
48	64	68	59	66	4	25	14.0	2.0	6
50	66	70	62	70	4	25	15.0	2.5	6
53	69	73	65	73	4	25	15.0	2.5	6
55	71	75	67	75	4	25	15.0	2.5	6
58	78	83	70	78	4	27	15.0	2.5	6
60	80	85	72	80	4	27	15.0	2.5	6
63	83	88	75	83	4	30	15.0	2.5	6
65	85	90	77	85	4	30	15.0	2.5	6

\* tolerance of  $L_3$  dimension is  $\pm 0.5$  mm  
Other dimensions are available as an option. Please contact ANGA.

## Application

General purpose VSK seal is recommended for clean mediums and with low content of abrasives.

It is designed for use with petrochemical products, poorly aggressive chemicals, and refrigerants in centrifugal pumps and other equipment with rotating shafts.

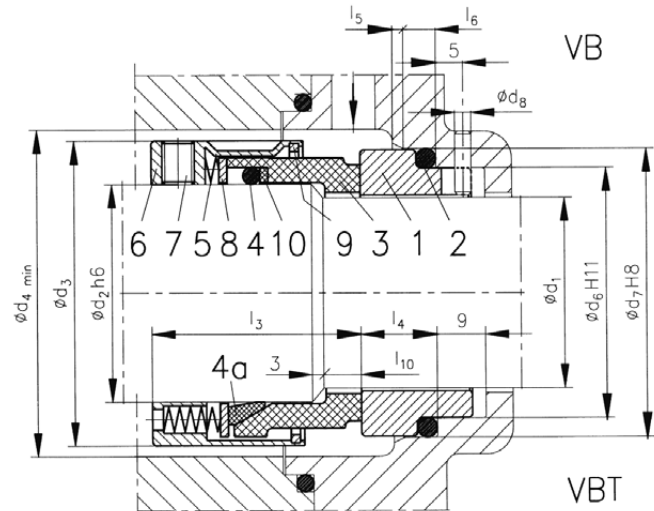
## Materials

Part	Code
Rotating ring	A, B, Q
Stationary ring	U2, Q, V, S
Secondary, flexible seals	E, K, V, M
Spring	G
Other metal parts	G

Operating limits**		
Pressure	$p_{max}$	2.5 MPa .. 5.0 MPa *
Temperature	$t_{max}$	200 °C
Speed	$v_{max}$	25 m/s

\* - maximum pressure depends on the diameter of mechanical seal: 2.5 MPa - dia 100 mm, 5.0 MPa - dia 18 mm.  
 \*\* - see note on page 3.

- Single mechanical seal
- Balanced
- Independent of the direction of shaft rotation
- Multi-spring



## Dimensions (mm)

\* - diameter  $d_2$  is a nominal dimension of VB, VBT seals.

D1	D2 *	D3	D4	D6	D7	D8	L3 **	L4	L5	L6	L10
18	22	36	38	27	33	3	33,5	11,5	2,0	5	8,5
20	24	38	40	29	35	3	33,5	11,5	2,0	5	8,5
22	26	40	42	31	37	3	33,5	11,5	2,0	5	8,5
24	28	42	44	33	39	3	36,0	11,5	2,0	5	8,5
25	30	44	46	34	40	3	36,0	11,5	2,0	5	8,5
28	33	47	49	37	43	3	38,5	11,5	2,0	5	8,5
30	35	49	51	39	45	3	38,5	11,5	2,0	5	8,5
32	38	54	58	42	48	3	38,5	11,5	2,0	5	8,5
33	38	54	58	42	48	3	38,5	11,5	2,0	5	8,5
35	40	56	60	44	50	3	38,5	11,5	2,0	5	8,5
38	43	59	63	49	56	4	38,5	14,0	2,0	6	9,0
40	45	61	65	51	58	4	38,5	14,0	2,0	6	9,0
43	48	64	68	54	61	4	38,5	14,0	2,0	6	9,0
45	50	66	70	56	63	4	38,5	14,0	2,0	6	9,0
48	53	69	73	59	66	4	38,5	14,0	2,0	6	9,0
50	55	71	75	62	70	4	42,5	15,0	2,5	6	10,0
53	58	78	83	65	73	4	42,5	15,0	2,5	6	10,0
55	60	80	85	67	75	4	42,5	15,0	2,5	6	10,0
58	63	83	88	70	78	4	47,5	15,0	2,5	6	10,0
60	65	85	90	72	80	4	47,5	15,0	2,5	6	10,0
63	68	88	93	75	83	4	47,5	15,0	2,5	6	10,0
65	70	90	95	77	85	4	47,5	15,0	2,5	6	10,0
70	75	99	104	83	92	4	53,0	17,0	2,5	7	11,0
75	80	104	109	88	97	4	53,0	17,0	2,5	7	11,0
80	85	109	114	95	105	4	53,0	17,0	3,0	7	11,0
85	90	114	119	100	110	4	58,0	17,0	3,0	7	11,0
90	95	119	124	105	115	4	58,0	17,0	3,0	7	11,0
95	100	124	129	110	120	4	58,0	17,0	3,0	7	11,0
100	105	130	135	115	125	4	58,0	17,0	3,0	7	11,0
105	110	135	140	120	130	4	55,0	20,0	3,0	7	8,0
110	115	140	145	125	135	4	55,0	20,0	3,0	7	8,0
115	120	145	150	130	140	4	55,0	20,0	3,0	7	8,0
120	125	150	155	135	145	4	55,0	20,0	3,0	7	8,0
125	130	155	160	140	150	4	55,0	20,0	3,0	7	8,0

\*\* tolerance of  $L_3$  dimension is  $\pm 0.5$  mm  
 Other dimensions are available as an option. Please contact ANGA.

## Legend

- |  |                                 |
|--|---------------------------------|
| 1. Stationary ring                     | 5. Springs                      |
| 2. O-ring                              | 6. Seal housing                 |
| 3. Rotating ring                       | 7. Set screw                    |
| 4. O-ring                              | 8. Thrust plate                 |
| 4a. PTFE wedge gasket<br>(version VBT) | 9. Snap spring ring             |
|  | 10. Anti-extrusion support ring |

## Application

General purpose seal designed for use with petroleum products, poorly aggressive chemicals, and refrigerants in centrifugal pumps and other equipment with rotating shafts.

## Materials

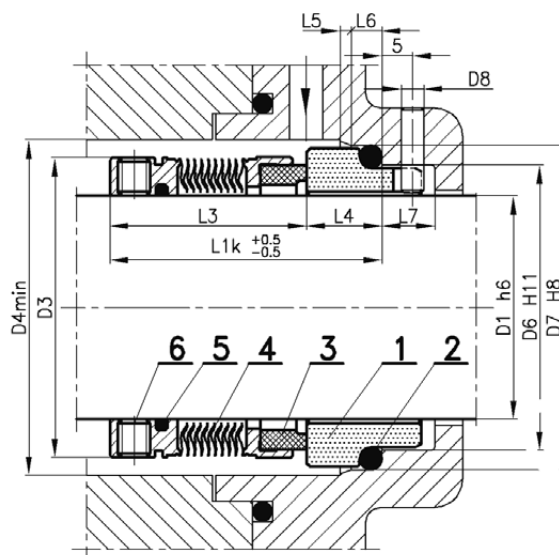
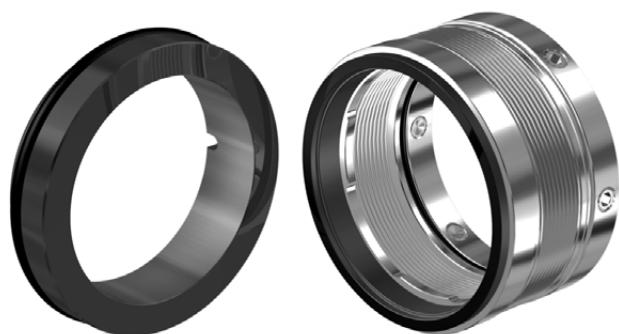
Part	Code
Rotating ring	A, B, Q
Stationary ring	U2, Q, V, S
Secondary, flexible seals	E, K, V, M, T
Spring	M
Other metal parts	G



Operating limits*		
Pressure	$p_{max}$	1.0 MPa
Temperature	$t_{max}$	-50 °C ÷ 260 °C
Speed	$v_{max}$	20 m/s

\* - see note on page 3.

- Single mechanical seal
- With metal bellows
- Balanced
- Dual directional



## Dimensions (mm)

D1	D3	D4	D6	D7	D8	L3	L4	L5	L6	L7
22	37,0	38	31	37	3	27,5	11,5	2	5	9
25	37,0	38	34	40	3	30,0	11,5	2	5	9
28	42,8	44	37	43	3	32,5	11,5	2	5	9
30	43,0	46	39	45	3	32,5	11,5	2	5	9
32	43,0	46	42	48	3	32,5	11,5	2	5	9
33	49,2	51	42	48	3	32,5	11,5	2	5	9
35	49,2	51	44	50	3	32,5	11,5	2	5	9
38	49,4	54	49	56	4	34,0	14	2	6	9
40	55,5	60	51	58	4	34,0	14	2	6	9
43	58,7	63	54	61	4	34,0	14	2	6	9
45	58,7	63	56	63	4	34,0	14	2	6	9
50	65,1	70	62	70	4	34,5	15	2,5	6	9
55	71,4	75	67	75	4	34,5	15	2,5	6	9
60	74,6	80	72	80	4	39,5	15	2,5	6	9
65	84,1	90	77	85	4	39,5	15	2,5	6	9
70	87,3	93	83	92	4	44,7	17	2,5	7	9
75	92,1	98	88	97	4	44,7	17	2,5	7	9
80	98,4	104	95	105	4	44,3	17	3	7	9
85	104,8	110	100	110	4	44,3	17	3	7	9
90	108,0	113	105	115	4	49,3	17	3	7	9
95	114,3	120	110	120	4	49,3	17	3	7	9
100	120,7	126	115	125	4	49,3	17	3	7	9

Other dimensions are available as an option. Please contact ANGA.

## Legend

1. Stationary ring
2. O-ring
3. Rotating ring
4. Seal housing and metal bellows
5. O-ring
6. Set screw

## Application

Type E1 mechanical seals are intended for use in petrochemical, chemical, pharmaceutical and food processing industries, for process pumps and other equipment with rotating shaft. Recommended for high temperature mediums e.g. hot oils, pitch, tar and other hydrocarbons, fuels, liquid gases and other mediums with low content of abrasives.

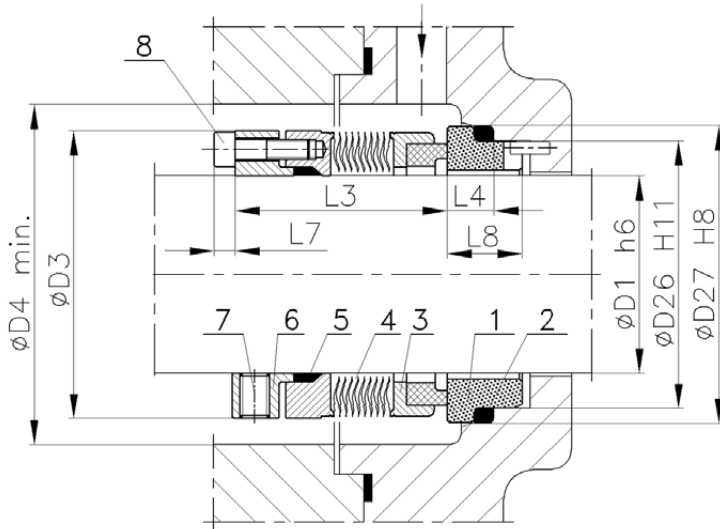
## Materials

Part	Code
Rotating ring	A, B, Q
Stationary ring	Q, V
Secondary, flexible seals	P, E, K, V
Metal bellows	G, M
Other metal parts	G, M

- Single mechanical seal
- With welded metal bellows
- Balanced
- Dual directional

Operating limits*		
Pressure	$p_{max}$	2.0 MPa
Temperature	$t_{max}$	-20 °C ÷ 400 °C
Speed	$v_{max}$	20 m/s

\* - see note on page 3.



## Legend

1. Stationary ring
2. Sealing ring
3. Rotating ring
4. Seal housing with welded metal bellows
5. Seal housing
6. Fixing ring
7. Set screw
8. Hex screw

## Application

This mechanical seal is intended for use in petrochemical, chemical and pharmaceutical industries, for process pumps and other equipment with rotating shaft. Recommended for high temperature mediums e.g. hot oils, pitch, tar and other hydrocarbons, fuels, liquid gases and other mediums with low content of abrasives.

## Materials

Part	Code
Rotating ring	A, B, Q
Stationary ring	Q
Secondary, flexible seals	G
Welded bellows	G, M
Other metal parts	T, M

## Dimensions (mm)

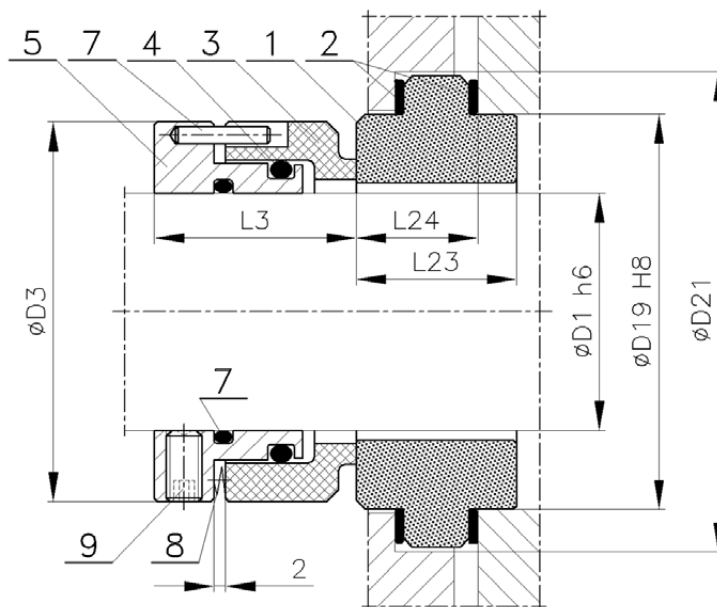
D1	D3	D4	D26	D27	L3	L4	L7	L8
25	40	42	35,16	41,28	42,8	6,6	3,2	11,1
28	43	45	38,33	44,45	39,7	6,6	3,2	11,1
30	46	48	41,50	47,62	42,8	6,6	3,2	11,1
32	46	48	44,68	50,80	42,8	6,6	3,2	11,1
33	49	51	44,68	50,80	44,5	6,6	3,2	11,1
35	49	51	44,68	50,80	44,5	6,6	3,2	11,1
38	55	57	47,85	53,98	44,5	6,6	4,2	11,1
40	58,5	63	54,20	60,32	44,5	8,0	4,2	12,7
43	61,5	66	57,38	63,50	44,5	8,0	4,2	12,7
45	61,5	66	60,55	66,68	44,5	8,0	4,2	12,7
48	65	69	63,83	69,85	44,5	8,0	4,2	12,7
50	68	72	63,83	69,85	44,5	8,0	4,2	12,7
53	71	75	70,08	76,20	44,5	8,8	4,2	14,3
55	74,5	79	73,26	79,38	47,6	8,8	4,2	14,3
60	77,5	83	76,43	82,55	47,6	8,8	4,2	14,3
63	81	86	79,60	85,72	47,6	9,6	4,2	15,9
65	84	89	79,60	85,72	47,6	9,6	4,2	15,9
70	87,5	93	82,78	88,90	47,6	9,6	4,2	15,9
75	95,5	101	88,98	98,42	47,6	11,4	4,8	15,9
80	98,5	104	95,33	104,78	47,6	11,4	4,8	15,9
85	105	110	98,50	107,95	47,6	11,4	4,8	15,9
90	108	113	104,85	114,30	47,6	12,5	4,8	17,5
95	114,5	120	108,15	117,48	47,6	12,5	4,8	17,5
100	121	126	114,38	123,82	47,6	12,5	4,8	17,5

\* tolerance of  $L_3$  dimension is  $\pm 0.5$  mm  
Other dimensions are available as an option. Please contact ANGA.

Operating limits*		
Pressure	$p_{max}$	1.0 MPa
Temperature	$t_{max}$	100 °C
Speed	$v_{max}$	10 m/s

\* - see note on page 3.

- Single mechanical seal
- Outside mounted
- Balanced
- Multispring
- Dual directional



## Dimensions (mm)

D1	D3	D19 <sub>(otwór)</sub>	D21	L3*	L23	L24	L25
22	44	39,7	51	34	17,6	13,8	10
24	48	42,9	54	34	17,6	13,8	10
25	48	42,9	54	34	17,6	14,3	11
28	52	50,8	65	34	27	20,5	14
30	55	54	68	34	27	20,5	14
32	55	54	68	34	27	20,5	14
33	58	57,2	71	34	27	20,5	14
35	59	57,2	71	34	27	20,5	14
38	63	63,5	78	34	27	20,5	14
40	64	66,7	81	34	27	20,5	14
43	68	69,9	84	34	27	20,5	14
45	70	69,9	84	43	27	20,5	14
48	77	79,4	97	43	33,3	25,3	17,3
50	77	79,4	97	43	33,3	25,3	17,3
53	80	82,6	100	43	33,3	25,8	18,3
55	80	85,8	103	43	33,3	25,8	18,3
58	84	88,9	106	43	33,3	25,8	18,3
60	86	88,9	106	43	33,3	25,8	18,3
63	88	92,1	110	43	33,3	25,8	18,3
65	91	95,3	113	43	33,3	25,8	18,3
68	93	98,5	116	43	33,3	25,8	18,3
70	98	98,5	116	43	33,3	25,8	18,3
75	105	103,2	121	43	33,3	25,8	18,3
80	111	114,3	132	43	33,3	25,8	18,3
85	116	120,7	138	43	33,3	25,8	18,3
90	121	127	144	43	33,3	25,8	18,3

\* tolerance of  $L_3$  dimension is  $\pm 0.5$  mm  
Other dimensions are available as an option. Please contact ANGA.

## Legend

- |                    |              |
|--------------------|--------------|
| 1. Stationary ring | 6. O-ring    |
| 2. Flat gasket     | 7. Drive pin |
| 3. Rotating ring   | 8. Springs   |
| 4. O-ring          | 9. Set screw |
| 5. Seal housing    |              |

## Application

This outside mounted mechanical seal is designed for poorly aggressive chemical substances and liquids containing solid particles. Used mostly in centrifugal pumps in purification plants, pulp & paper, chemical and sugar industries.

## Materials

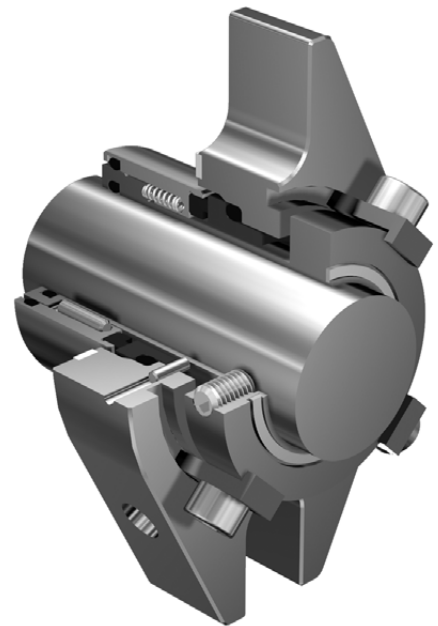
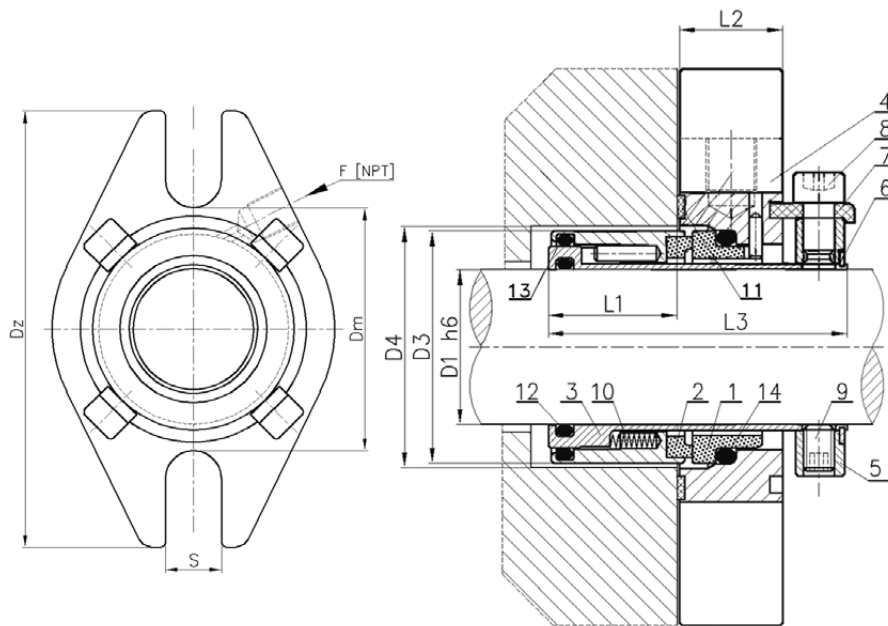
Part	Code
Rotating ring	B, U2, Q
Stationary ring	U2, Q, V, S
Secondary, flexible seals	E, P, K, V
Spring	M
Other metal parts	G



- Single mechanical seal
- Compact (cartridge) design
- Balanced
- Dual directional
- Multispring

Operating limits*		
Pressure	$p_{max}$	2.0 MPa
Temperature	$t_{max}$	-50°C ÷ 200°C
Speed	$v_{max}$	12.5 m/s

\* - see note on page 3.



## Legend

- |                    |                 |
|--------------------|-----------------|
| 1. Stationary ring | 8. Hex screw    |
| 2. Rotating ring   | 9. Set screw    |
| 3. Sleeve          | 10. Springs     |
| 4. Cover           | 11. Flat gasket |
| 5. Clamp ring      | 12. O-ring      |
| 6. Retaining ring  | 13. O-ring      |
| 7. Distance plate  | 14. O-ring      |

## Application

This general purpose UST mechanical seal is designed for a wide range of applications in centrifugal pumps handling hot and cold water, oils, fuels, poorly aggressive chemicals and fluids with low content of abrasives.

## Materials

Part	Code
Stationary ring	Q, U
Rotating ring	A, B, Q, U
Secondary, flexible seals	P, V, E, K
Spring	M
Other metal parts	G

## Dimensions (mm)

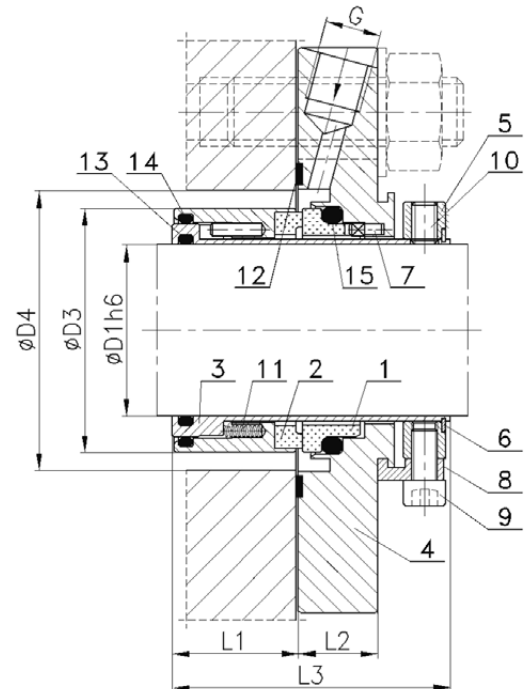
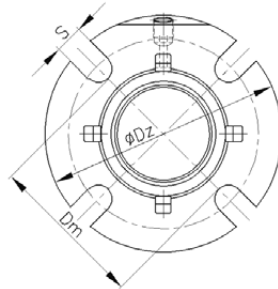
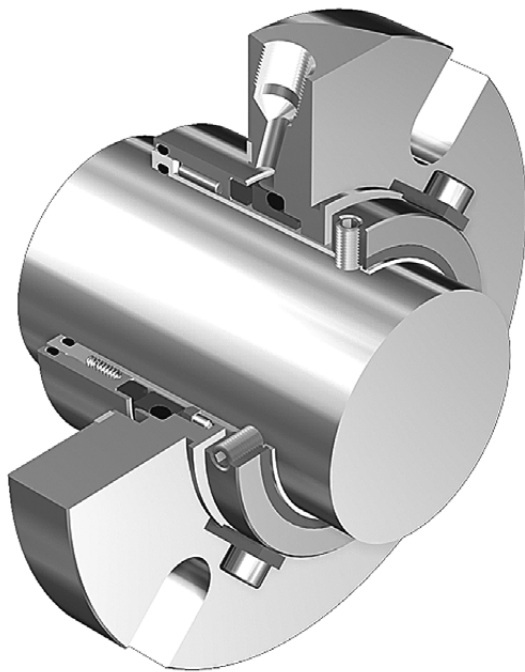
D1	D3	D4min	D4max	Dm	Dz	L1	L2	L3	S	F
24	39.2	40	48	54	102	25.0	20.0	58	14	1/8
25	40.2	41	48	54	102	25.0	20.0	58	14	1/8
28	43.2	44	52	58	105	25.0	20.0	58	14	1/8
30	45.2	46	54	60	108	25.0	20.0	58	14	1/8
32	47.2	48	54	60	108	25.0	20.0	58	14	1/8
33	48.2	49	54	60	108	25.0	20.0	58	14	1/8
35	50.2	51	59	65	108	25.0	20.0	58	14	1/8
38	55.0	56	64	70	114	25.0	20.0	59	14	1/8
40	57.0	58	64	70	114	25.0	20.0	59	14	1/8
43	60.0	61	67	73	120	25.0	20.0	59	14	1/8
45	62.0	63	70	76	127	25.0	20.0	59	14	1/8
48	65.0	66	73	79	133	25.0	20.0	59	14	1/8
50	67.0	68	73	79	133	25.0	20.0	59	14	1/8
53	70.0	71	76	83	140	26.0	20.0	60	18	1/8
55	72.5	74.5	80	86	146	26.0	20.0	60	18	1/8
58	75.0	77	86	92	165	26.0	20.0	60	22	1/8
60	77.0	79	86	92	165	27.0	20.0	61	22	1/8
63	81.0	83	102	108	178	25.5	25.0	64	22	1/4
65	86.0	88	102	108	178	25.5	25.0	64	22	1/4
68	90.0	92	102	108	178	25.5	25.0	64	22	1/4
70	90.0	92	102	108	178	25.5	25.0	64	22	1/4
75	96.0	98	118	124	190	25.5	25.0	64	22	1/4
80	100.5	102	118	124	190	25.5	25.0	64	22	1/4

\* tolerance of  $L_3$  dimension is  $\pm 0.5$  mm  
Other dimensions are available as an option. Please contact ANGA.

Operating limits*		
Pressure	$p_{max}$	2.0 MPa
Temperature	$t_{max}$	180 °C
Speed	$v_{max}$	12,5 m/s

\* - see note on page 3.

- Single mechanical seal
- Compact (cartridge) design
- Balanced
- Dual directional
- Multispring



## Dimensions (mm)

D1	D3	D4min	D4max	Dm	Dz	L1	L2	L3	S	G
24	39.2	40.0	46.0	52.5	102	27	18	61.5	14	1/4
25	40.2	41.0	49.0	55.5	105	27	18	61.5	14	1/4
28	43.2	44.0	52.5	58.5	108	27	18	61.5	14	1/4
30	45.2	46.0	55.5	62.0	111	27	18	61.5	14	1/4
32	47.2	48.0	55.5	62.0	111	27	18	61.5	14	1/4
33	48.2	49.0	55.5	62.0	111	27	18	61.5	14	1/4
35	50.2	51.0	57.5	66.5	111	27	18	61.5	14	1/4
38	55.0	57.2	60.5	73.0	127	28	18	63.5	14	1/4
40	57.0	58.0	60.5	73.0	127	28	18	63.5	14	1/4
43	60.0	61.0	63.5	73.0	127	28	18	63.5	14	1/4
45	62.0	63.5	70.0	76.0	133	28	18	63.5	14	1/4
48	65.0	66.7	73.0	84.0	140	28	18	63.5	14	1/4
50	67.0	68.0	73.0	84.0	140	28	18	63.5	14	1/4
53	70.0	71.0	76.0	84.0	140	29	19	65.0	14	1/4
55	72.5	74.0	79.5	93.5	146	29	19	65.0	18	1/4
58	75.0	76.2	82.5	93.5	146	29	19	65.0	18	1/4
60	77.0	79.4	86.0	100.0	152	29	19	65.0	18	1/4
63	84.0	85.8	92.0	106.5	159	30.5	19	66.5	18	1/4
65	86.0	88.9	95.0	106.5	159	30.5	19	66.5	18	1/4
70	90.0	92.1	98.5	109.5	159	30.5	19	66.5	18	1/4

Other dimensions are available as an option. Please contact ANGA.

## Legend

- |                    |                      |
|--------------------|----------------------|
| 1. Stationary ring | 9. Socket head screw |
| 2. Rotating ring   | 10. Grub screw       |
| 3. Sleeve          | 11. Springs          |
| 4. Cover           | 12. Flat gasket      |
| 5. Clamping ring   | 13. O-ring           |
| 6. Expanding ring  | 14. O-ring           |
| 7. Pin             | 15. O-ring           |
| 8. Distance plate  |                      |

## Application

Type USC is designed for a wide range of applications. It withstands such fluids as cold and hot water, oils, petroleum products, poorly aggressive chemical substances and other fluids containing abrasive particles.

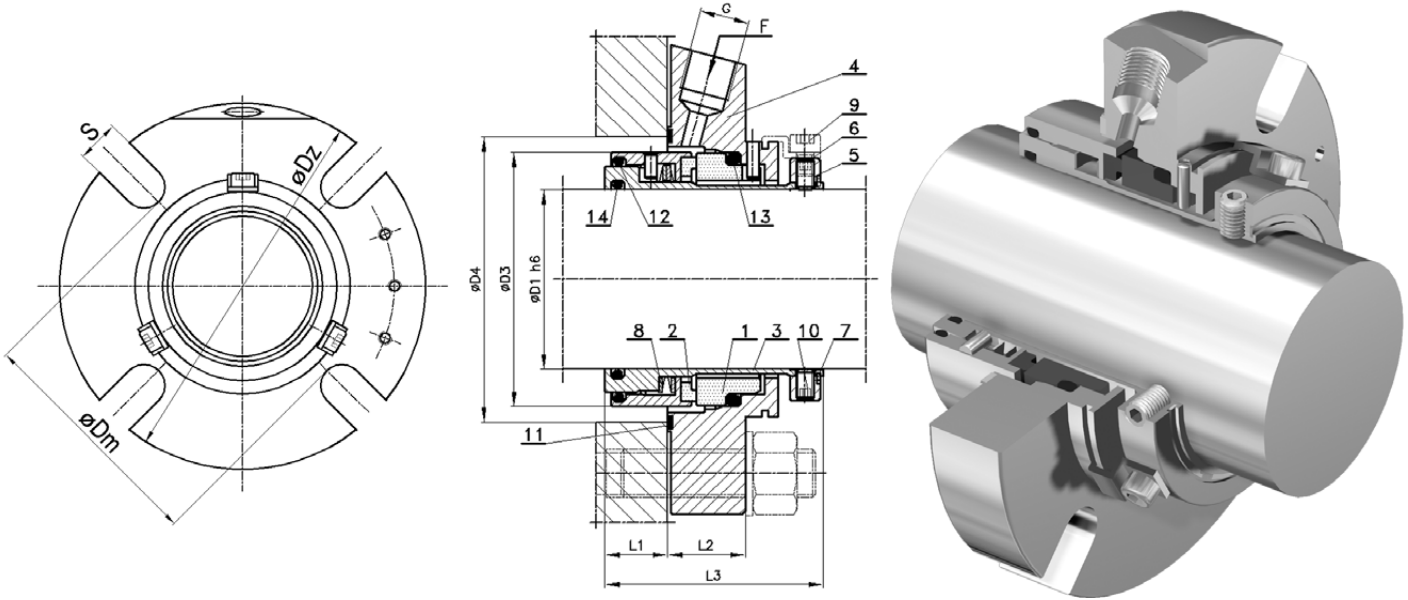
## Materials

Part	Code
Stationary and rotating rings	A, B, U, Q
Secondary, flexible seals	E, P, K, V
Spring	M
Other metal parts	G

- Single mechanical seal
- Compact (cartridge) design
- Balanced
- Dual directional
- Wave spring

Operating limits*		
Pressure	$p_{max}$	2.0 MPa
Temperature	$t_{max}$	180 °C
Speed	$v_{max}$	20 m/s

\* - see note on page 3.



## Legend

- |                    |                 |
|--------------------|-----------------|
| 1. Stationary ring | 8. Wave spring  |
| 2. Rotating ring   | 9. Hex screw    |
| 3. Sleeve          | 10. Set screws  |
| 4. Cover           | 11. Flat gasket |
| 5. Clamp ring      | 12. O-ring      |
| 6. Aligning clamps | 13. O-ring      |
| 7. Retaining ring  | 14. O-ring      |

## Application

Type USS is a general purpose mechanical seal and it is designed for a wide range of applications. It withstands such fluids as cold and hot water, oils, petroleum products, poorly aggressive chemical substances and other fluids containing abrasive particles.

It is recommended for most mediums in the food industry.

## Materials

Part	Code
Stationary ring	Q, U
Rotating ring	A, B, Q
Secondary, flexible seals	P, V, E, K
Spring	G, M
Other metal parts	G

## Dimensions (mm)

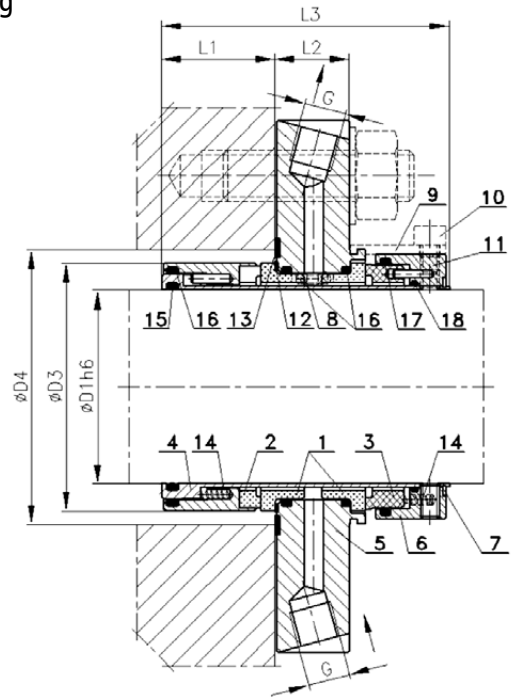
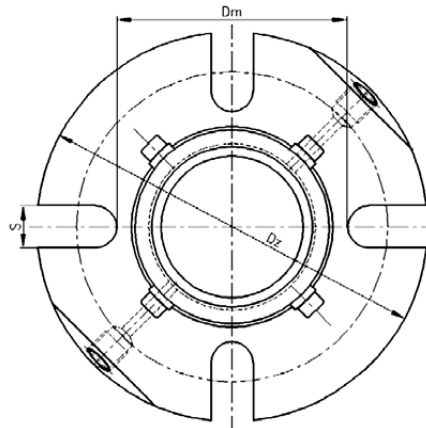
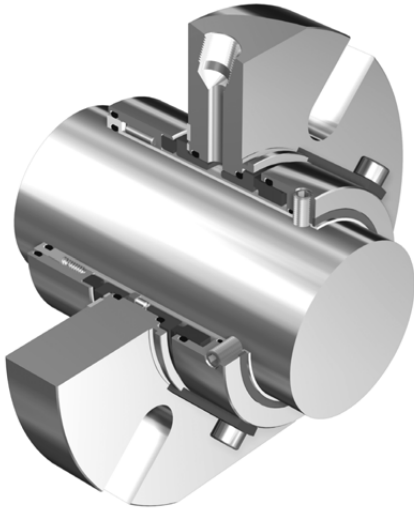
D1	D3	D4min	D4max	Dm	Dz	L1	L2	L3	S	G
22	39	41	48	56	105	10	26	60	14	1/4
25	42	44	51	58	105	12	26	62	14	1/4
26	44	46	52	65	105	12	26	62	14	1/4
28	46	48	52	65	105	12	26	62	14	1/4
30	47	49	56	65	105	12	26	62	14	1/4
32	49	51	57	67	105	12	26	62	14	1/4
33	49	51	62	70	113	12	26	62	14	1/4
35	54	56	66	75	123	15	26	65	14	3/8
38	59	61	69	75	123	15	26	65	16	3/8
40	61	63	69	80	130	15	26	65	16	3/8
43	64	66	70	80	130	15	26	65	16	3/8
45	66	68	73	84	138	16	26	67	16	3/8
48	69	71	75	84	138	16	26	67	16	3/8
50	71	73	78	87	142	16	26	67	18	3/8
53	78	80	87	97	147	21	26	73	18	3/8
55	80	82	87	97	147	21	26	73	18	3/8
60	85	87	91	97	157	21	26	73	18	3/8
65	90	92	99	102	163	29	26	82	18	3/8
70	99	101	108	109	170	29	26	82	18	3/8
75	104	106	119	118	190	29	26	82	18	3/8
80	109	112	124	129	195	29	26	82	18	3/8
85	114	117	128	135	200	33	30	90	22	3/8
90	119	122	135	145	205	33	30	90	22	3/8
95	124	127	137	148	210	33	30	90	22	3/8
100	130	133	144	154	218	33	30	90	22	3/8

\* tolerance of  $L_1$  dimension is  $\pm 0.5$  mm  
Other dimensions are available as an option. Please contact ANGA.

Operating limits*		
Pressure	$p_{max}$	2.0 MPa
Temperature	$t_{max}$	120 °C
Speed	$v_{max}$	12,5 m/s

\* - see note on page 3.

- Double seal
- Compact (cartridge) design
- Balanced
- Dual directional
- Multispring



## Dimensions (mm)

D1	D3	D4min	D4max	Dm	Dz	L1	L2	L3	S	G
24	39.2	40.0	46.0	54.0	105	32.5	21	85	14	1/4
25	40.2	41.0	49.0	54.0	105	32.5	21	85	14	1/4
28	43.2	44.0	52.5	57.0	108	32.5	21	85	14	1/4
30	45.2	46.0	55.5	60.5	111	32.5	21	85	14	1/4
32	47.2	48.0	55.5	60.5	111	32.5	21	85	14	1/4
33	48.2	49.0	55.5	60.5	111	32.5	21	85	14	1/4
35	50.2	51.0	57.5	63.5	111	32.5	21	85	14	1/4
38	55.0	57.2	60.5	71.5	127	34	23	87	14	1/4
40	57.0	58.0	60.5	71.5	127	34	23	87	14	1/4
43	60.0	61.0	63.5	71.5	127	34	23	87	14	1/4
45	62.0	63.5	70.0	81.0	140	34	23	87	14	1/4
48	65.0	66.7	73.0	81.0	140	34	23	87	14	1/4
50	67.0	68.0	73.0	81.0	140	34	23	87	14	1/4
53	70.0	71.0	76.0	90.5	152	35	23	89	14	1/4
55	72.5	74.0	79.5	90.5	152	35	23	89	14	1/4
58	75.0	76.2	82.5	96.8	165	35	23	89	18	1/4
60	77.0	79.4	86.0	96.8	165	35	23	89	18	1/4
63	84.0	85.8	92.0	109.5	178	38	25	98	18	1/4
65	86.0	88.9	95.0	109.5	178	38	25	98	18	1/4
68	90.0	92.1	98.5	109.5	178	38	25	98	18	1/4
70	90.0	92.1	98.5	109.5	178	38	25	98	18	1/4
75	96.0	98.5	108.0	125.5	190	38	25	98	18	1/4
80	100.5	101.6	111.0	125.5	190	38	25	98	18	1/4
85	107.0	108.0	117.5	135.0	203	38	25	98	22	1/4
90	111.5	114.3	127.0	151.0	216	38	25	98	22	1/4
95	116.0	117.5	130.5	151.0	216	38	25	98	22	1/4
100	121.0	123.9	140.0	168.0	228	38	25	98	22	1/4
105	127.0	130.0	149.0	168.0	228	38	25	98	22	1/4
110	132.5	136.5	159.0	178.0	241	38	25	98	22	1/4
115	141.5	142.9	168.0	186.5	254	38	25	98	22	1/4
120	141.5	142.9	168.0	186.5	254	38	25	98	22	1/4
125	146.5	149.2	168.0	186.5	254	38	25	98	22	1/4

Other dimensions are available as an option. Please contact ANGA.

## Legend

- |                    |                       |
|--------------------|-----------------------|
| 1. Stationary ring | 10. Socket head screw |
| 2. Rotating ring   | 11. Grub screw        |
| 3. Rotating ring   | 12. Thrust ring       |
| 4. Sleeve          | 13. Flat gasket       |
| 5. Cover           | 14. Springs           |
| 6. Clamping ring   | 15. O-ring            |
| 7. Expanding ring  | 16. O-ring            |
| 8. Pin             | 17. O-ring            |
| 9. Distance plate  | 18. O-ring            |

## Application

USP is a mechanical seal used for high viscosity products containing abrasive particles.

USP mechanical seal requires the following fluid installations:

- buffer (API Plan 52 ) or
- barrier (API Plan 53).

## Note

Max. pressure of barrier fluid is 1.6 MPa, but max. overpressure of barrier fluid is 0.5 MPa.

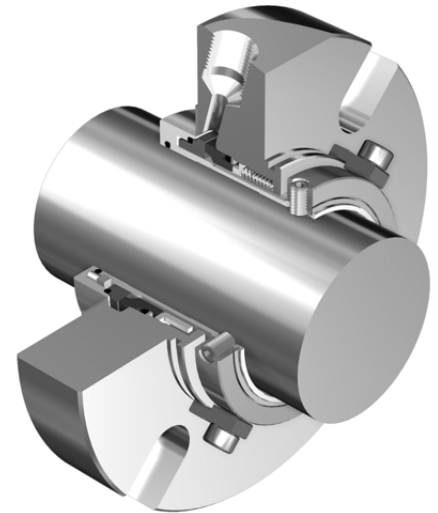
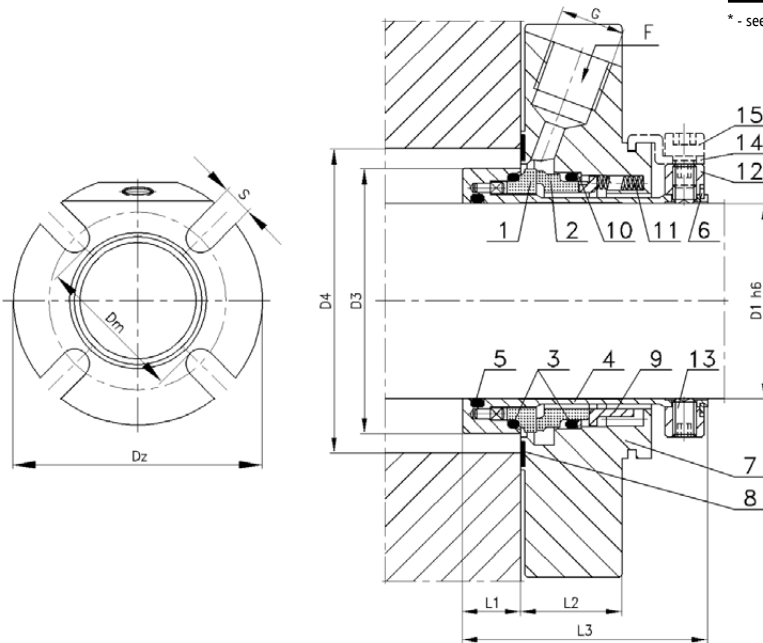
## Materials

Part	Code
Rotating rings	A, B, U, Q
Stationary rings	Q, U
Secondary, flexible seals	V
Other metal parts	G

- Single mechanical seal
- Compact (cartridge) design
- Balanced
- Dual directional
- Multispring

Operating limits*		
Pressure	$p_{max}$	2.0 MPa
Temperature	$t_{max}$	200 °C
Speed	$v_{max}$	12,5 m/s

\* - see note on page 3.



## Legend

- |                    |                     |
|--------------------|---------------------|
| 1. Rotating ring   | 8. Flat gasket      |
| 2. Stationary ring | 9. Thrust ring      |
| 3. O-ring          | 10. Washer          |
| 4. Sleeve          | 11. Springs         |
| 5. O-ring          | 12. Clamp ring      |
| 6. Retaining ring  | 13. Set screw       |
| 7. Cover           | 14. Aligning clamps |
|                    | 15. Hex screw       |

## Application

BE2 seals are designed for process rotodynamic pumps and other equipment with rotational shafts working with different mediums, such as, e.g.:

- hydrocarbons and oils,
- poorly aggressive chemicals (pH>5),
- slimes and slurries with abrasive solids (up to 15%),
- water (pure, dirty, wastewater).

## Features

- compact design very suitable for stuffing boxes with restricted space,
- easy and quick assembly and disassembly,
- can replace packing seals directly,
- the seal is centered against the pump shaft,
- stationary ring can compensate the shaft, both radial runout and axial moves,
- springs are protected against contact with pumped medium.

## Materials

Part	Code
Rotating ring	B, U2, Q
Stationary ring	U2, Q, V, S
Secondary, flexible seals	E, P, K, V
Spring	M
Other metal parts	G

## Dimensions (mm)

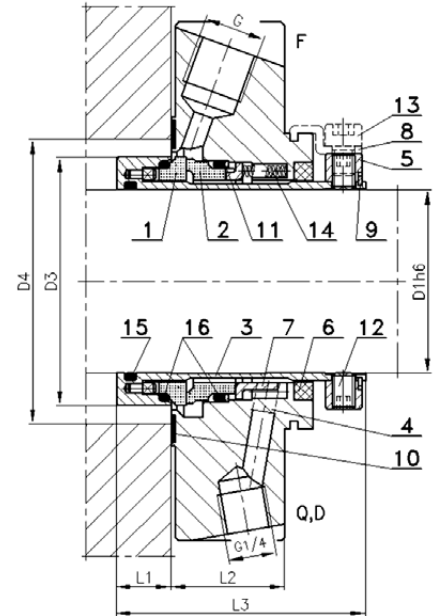
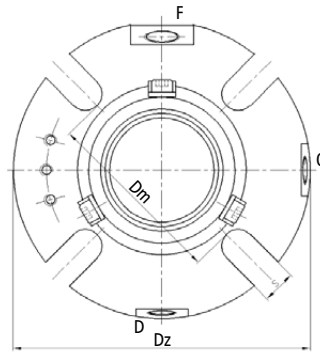
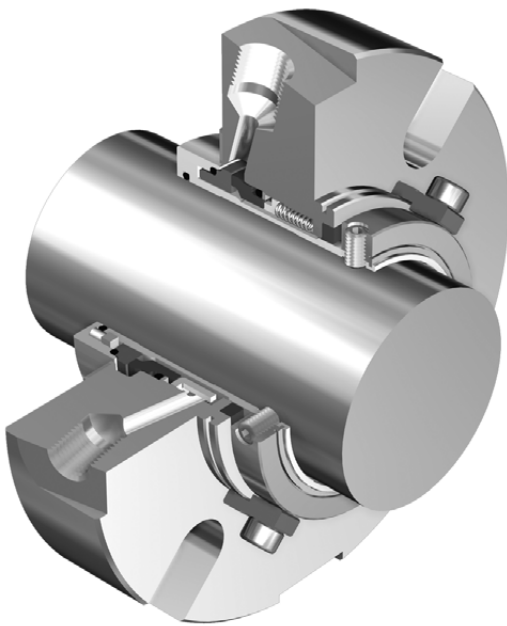
D1	D3	D4min	D4max	Dm	Dz	L1	L2	L3	S	G
22	38,0	40,0	48,0	56	105	15	28	63	14	1/4
25	43,0	44,0	51,0	58	105	15	28	63	14	1/4
26	46,0	47,0	52,0	65	105	15	28	63	14	1/4
28	46,0	47,0	52,0	65	105	15	28	63	14	1/4
30	48,0	49,0	56,0	65	105	15	28	63	14	1/4
32	49,8	51,0	57,0	67	105	15	28	63	14	1/4
33	49,8	51,0	57,0	67	110	15	28	63	14	1/4
35	53,0	54,0	62,0	70	113	15	28	63	14	3/8
38	56,0	57,0	66,0	75	123	15	28	63	14	3/8
40	58,0	59,0	69,0	75	123	15	28	63	16	3/8
43	60,5	61,5	70,5	80	130	15	28	63	16	3/8
45	62,5	64,0	73,0	80	130	15	28	63	16	3/8
48	65,6	67,0	75,0	84	138	15	28	63	16	3/8
50	68,0	69,0	78,0	87	142	15	28	63	16	3/8
53	72,0	73,0	87,0	97	147	15	28	63	18	3/8
55	73,0	74,0	83,0	97	147	15	28	63	18	3/8
60	78,0	79,0	91,0	102	157	15	28	63	18	3/8
65	83,0	84,5	99,0	109	163	15	28	63	18	3/8
70	93,0	95,0	108,0	118	170	19	32	77	18	3/8
75	98,0	100,0	119,0	129	190	19	32	77	18	3/8
80	105,0	107,0	124,0	135	195	19	32	77	18	3/8
85	110,0	112,0	128,0	139	200	19	32	77	22	3/8
90	115,0	117,0	135,0	145	205	19	32	77	22	3/8
95	119,0	120,7	137,0	148	210	19	32	77	22	3/8
100	125,4	127,0	144,0	154	218	19	32	77	22	3/8

Other dimensions are available as an option. Please contact ANGA.

Operating limits*		
Pressure	$p_{max}$	2.0 MPa
Temperature	$t_{max}$	260 °C
Speed	$v_{max}$	12,5 m/s

\* - see note on page 3.

- Single mechanical seal
- Cartridge (compact) design
- Balanced
- Dual directional
- Multi-spring



## Dimensions (mm)

D1	D3	D4min	D4max	Dm	Dz	L1	L2	L3	S	G
22	38.0	40.0	48.0	56.0	105	15	31	68	14	1/4
25	43.0	44.0	51.0	58.0	105	15	31	68	14	1/4
26	46.0	47.0	52.0	65.0	105	15	31	68	14	1/4
28	46.0	47.0	52.0	65.0	105	15	31	68	14	1/4
30	48.0	49.0	56.0	65.0	105	15	31	68	14	1/4
32	49.8	51.0	57.0	67.0	105	15	31	68	14	1/4
33	49.8	51.0	57.0	67.0	110	15	31	68	14	1/4
35	53.0	54.0	62.0	70.0	113	15	31	68	14	3/8
38	56.0	57.0	66.0	75.0	123	15	31	68	14	3/8
40	58.0	59.0	69.0	75.0	123	15	31	68	16	3/8
43	60.5	61.5	70.5	80.0	130	15	31	68	16	3/8
45	62.5	64.0	73.0	80.0	130	15	31	68	16	3/8
48	65.6	67.0	75.0	84.0	138	15	31	68	16	3/8
50	68.0	69.0	78.0	87.0	142	15	31	68	16	3/8
53	72.0	73.0	87.0	97.0	147	15	31	68	18	3/8
55	73.0	74.0	83.0	97.0	147	15	31	68	18	3/8
60	78.0	79.0	91.0	102.0	157	15	31	68	18	3/8
65	83.0	84.5	99.0	109.0	163	15	31	68	18	3/8
70	93.0	95.0	108.0	118.0	170	19	40	85	18	3/8
75	98.0	100.0	119.0	129.0	190	19	40	85	18	3/8
80	105.0	107.0	124.0	135.0	195	19	40	85	18	3/8
85	110.0	112.0	128.0	139.0	200	19	40	85	22	3/8
90	115.0	117.0	135.0	145.0	205	19	40	85	22	3/8
95	119.0	120.7	137.0	148.0	210	19	40	85	22	3/8
100	125.4	127.0	144.0	154.0	218	19	40	85	22	3/8

Other dimensions are available as an option. Please contact ANGA.

## Legend

- |                     |                   |
|---------------------|-------------------|
| 1. Rotating ring    | 9. Retaining ring |
| 2. Stationary ring  | 10. Flat gasket   |
| 3. Sleeve           | 11. Thrust ring   |
| 4. Cover            | 12. Set screw     |
| 5. Clamp ring       | 13. Hex screw     |
| 6. Throttle bushing | 14. Springs       |
| 7. Thrust ring      | 15. O-ring        |
| 8. Distance plate   |                   |

## Application

Type BEQ is a general purpose mechanical seal with a wide scope of applications.

It is designed for hot and cold water, oils, fuels, poorly aggressive chemicals and other liquids containing solid particles. Due to its compact design, it is suitable for stuffing boxes with packing seals. Type BEQ mechanical seal can be connected to external flushing installation acc. to API 682 Plan 11/61 or 32/61.

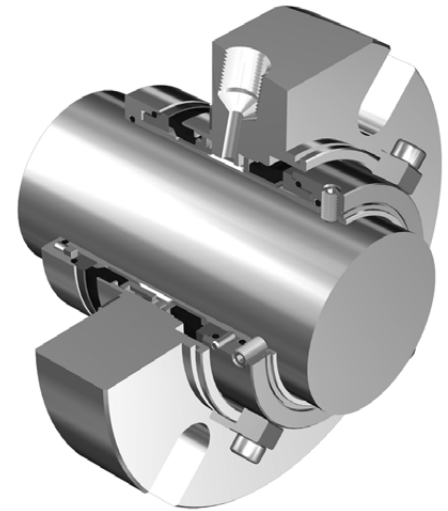
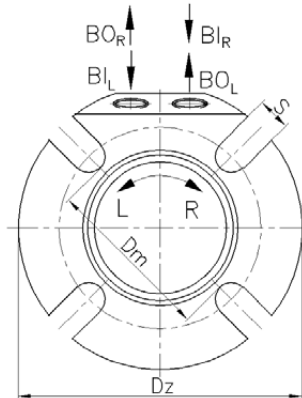
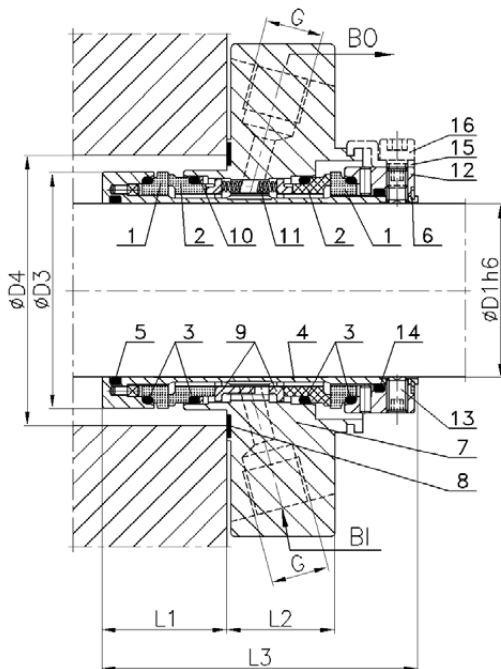
## Materials

Part	Code
Stationary and rotating rings	A, B, U, Q
Secondary, flexible seals	E, P, K, V
Spring	M
Other metal parts	G

- Double mechanical seal
- Compact (cartridge) design
- Balanced
- Multi-spring
- Dual directional

Operating limits*		
Pressure	$p_{max}$	1.6 MPa
Temperature	$t_{max}$	200 °C
Speed	$v_{max}$	12,5 m/s

\* - see note on page 3.



## Legend

- |                    |                     |
|--------------------|---------------------|
| 1. Rotating ring   | 8. Flat gasket      |
| 2. Stationary ring | 9. Thrust ring      |
| 3. O-ring          | 10. Washer          |
| 4. Sleeve          | 11. Springs         |
| 5. O-ring          | 12. Clamp ring      |
| 6. Retaining ring  | 13. Set screw       |
| 7. Cover           | 14. O-ring          |
|                    | 15. Aligning clamps |
|                    | 16. Hex screw       |

## Application

Type BED mechanical seals are designed for process centrifugal pumps and mixers handling fluids containing abrasive particles (ashes, ores, cement and other similar substances), heavy consistence or gluey slurries and they are used mostly in the following industries: petrochemical, refinery, chemical, pulp & paper, sugar and in wastewater treatment plants. It is recommended for mediums hazardous to humans and the environment.

BED type seal requires application of buffer liquid (API Plan 52) or barrier liquid external installation (API Plan 53). Maximum pressure of the buffer fluid is 1.8 MPa. If the temperature of the sealed liquid exceeds 80°C, installation with a cooler should be used.

## Materials

Part	Code
Stationary and rotating rings	A, B, U, Q
Secondary, flexible seals	E, P, K, V
Spring	M
Other metal parts	G

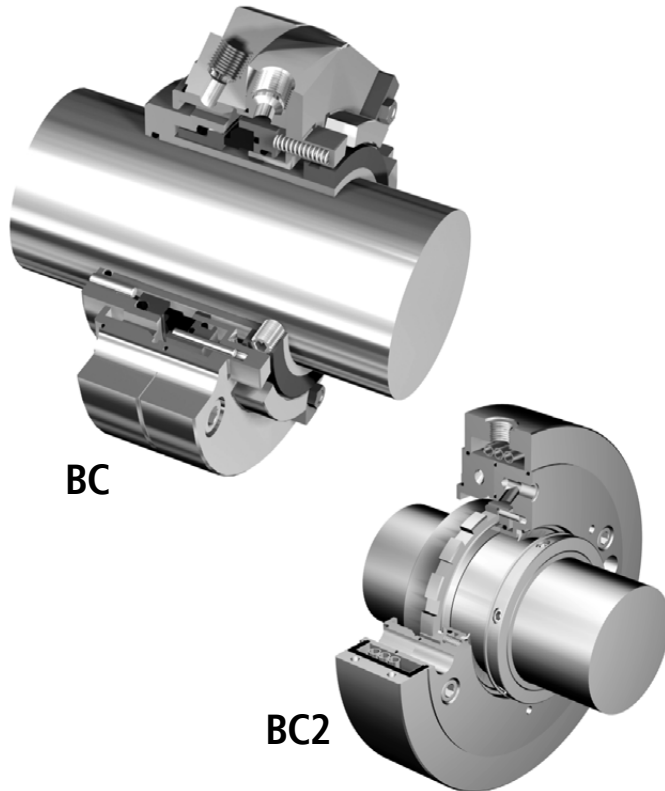
## Dimensions (mm)

D1	D3	D4min	D4max	Dm	Dz	L1	L2	L3	S	G
22	38,0	40,0	48,0	56	105	36	31	91	14	1/4
25	43,0	44,0	51,0	58	105	36	31	91	14	1/4
26	46,0	47,0	52,0	65	105	36	31	91	14	1/4
28	46,0	47,0	52,0	65	105	36	31	91	14	1/4
30	48,0	49,0	56,0	65	105	36	31	91	14	1/4
32	49,8	51,0	57,0	67	105	36	31	91	14	1/4
33	49,8	51,0	57,0	67	110	36	31	91	14	1/4
35	53,0	54,0	62,0	70	113	36	31	91	14	3/8
38	56,0	57,0	66,0	75	123	36	31	91	14	3/8
40	58,0	59,0	69,0	75	123	36	31	91	16	3/8
43	60,5	61,5	70,5	80	130	36	31	91	16	3/8
45	62,5	64,0	73,0	80	130	36	31	91	16	3/8
48	65,6	67,0	75,0	84	138	36	31	91	16	3/8
50	68,0	69,0	78,0	87	142	36	31	91	16	3/8
53	72,0	73,0	87,0	97	147	36	31	91	18	3/8
55	73,0	74,0	83,0	97	147	36	31	91	18	3/8
60	78,0	79,0	91,0	102	157	36	31	91	18	3/8
65	83,0	84,5	99,0	109	163	36	31	91	18	3/8
70	93,0	95,0	108,0	118	170	46	35	112	18	3/8
75	98,0	100,0	119,0	129	190	46	35	112	18	3/8
80	105,0	107,0	124,0	135	195	46	35	112	18	3/8
85	110,0	112,0	128,0	139	200	46	35	112	22	3/8
90	115,0	117,0	135,0	145	205	46	35	112	22	3/8
95	119,0	120,7	137,0	148	210	46	35	112	22	3/8
100	125,4	127,0	144,0	154	218	46	35	112	22	3/8

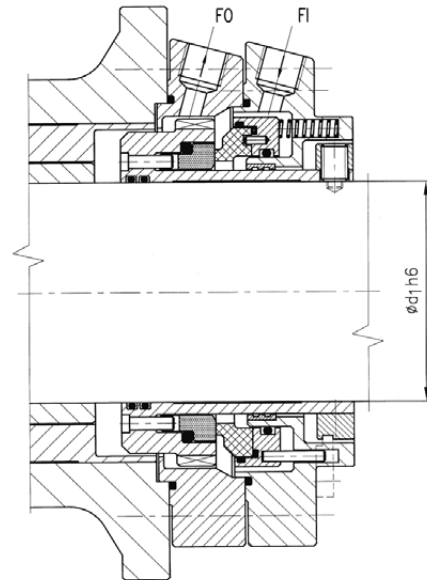
Other dimensions are available as an option. Please contact ANGA.

Operating limits*		
Pressure	$p_{max}$	6.0 MPa
Temperature	$t_{max}$	200 °C
Speed	$v_{max}$	25 m/s

\* - see note on page 3.



- Single compact (cartridge) mechanical seals
- Balanced
- Dual directional
- Multi-spring



## Application

Mechanical seals types BC are designed for centrifugal pumps and other equipment with rotating shafts handling hot water mainly used in heat and power plants and other industries that use process hot water.

ANGA offers also version BC2 with integral cooler. Main body of the seal is the same like in type BC with a cooling effect forced by rotation of the seal and the same way of assembling. The cooling system is optimized and redesigned in a specific way.

## Examples of application

Type of seal	Type of pump	Manufacturers of pumps
34 BC	8 C 16	POWEN-WAFAPOMP GROUP
41 BC	6 CD 25	POWEN-WAFAPOMP GROUP
45 BC (55 BC)	W 14 P	POWEN-WAFAPOMP GROUP
48 BC (56 BC)	W 14 PzAx4GV	POWEN-WAFAPOMP GROUP
50 BC	HG-3D	KSB
52 BC	HG1	KSB
58 BC	WT 200	KSB
68 BC	HM 200x3	POWEN-WAFAPOMP GROUP
75 BC (85 BC)	HD 150x8	POWEN-WAFAPOMP GROUP
80 BC (88 BC)	15 Z 28, 15 Z 33	POWEN-WAFAPOMP GROUP
85 BC	FA1D	WORTHINGTON
110 BC	150 CHP	SIGMA
110 BC	200 CHP	SIGMA
110 BC	HDG	KSB
110 BC	PE-270	SIGMA
140 BC	12 WNC 146	WORTHINGTON

## Features

- Cartridge, compact design without auxiliary external installation (cooler, pipes and other equipment),
- easy and quick assembly and disassembly,
- better working conditions of the seal - better heat dissipation,
- while the pump is not working, the seal is cooled continuously and o-rings have longer lifetime.

## Materials

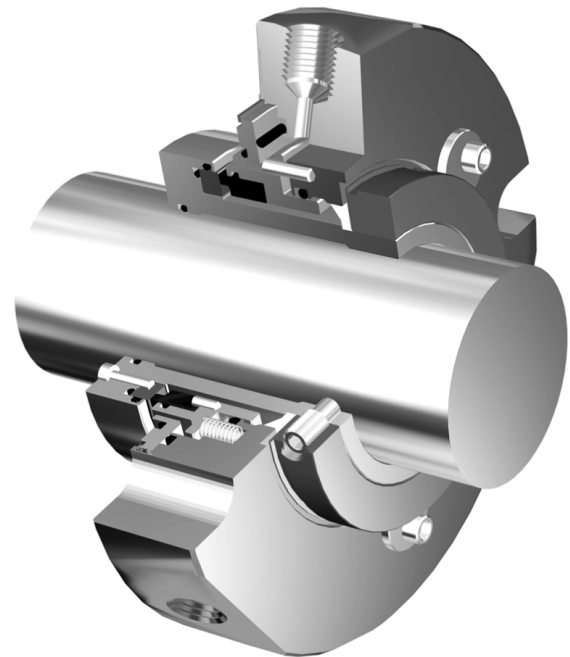
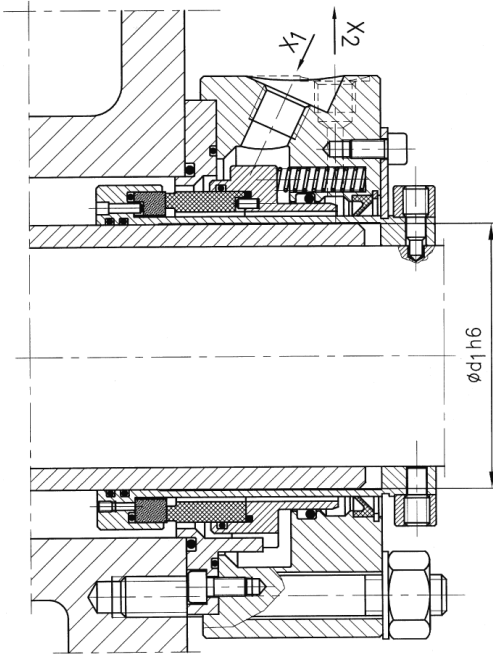
Part	Code
Stationary and rotating rings	A, B, U, Q
Secondary, flexible seals	E, P, K, V
Spring	G, M
Other metal parts	F, G



- Single compact (cartridge) mechanical seals
- Balanced
- Dual directional
- Multi-spring

Operating limits*		
Pressure	$p_{max}$	2.5 MPa
Temperature	$t_{max}$	200 °C
Speed	$v_{max}$	25 m/s

\* - see note on page 3.



## Application

Mechanical seals types BD are designed for centrifugal pumps and other equipment with rotating shafts handling hot water mainly used in heat and power plants and other industries that use process hot water.

## Examples of application

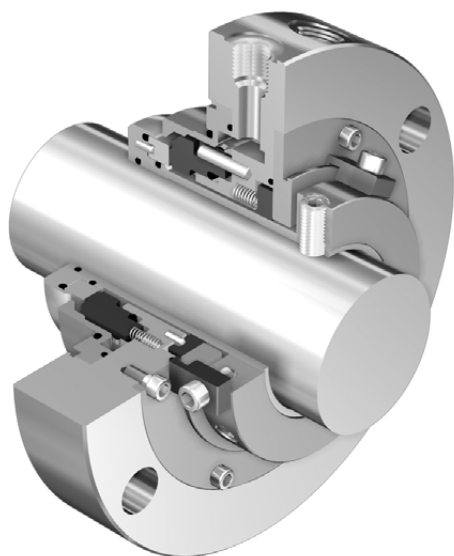
Type of seal	Type of pump	Manufacturers of pumps
49 BD	25 D 17	POWEN-WAFAPOMP GROUP
50 BD	10 K 22	POWEN-WAFAPOMP GROUP
60 BD	20 K 37	POWEN-WAFAPOMP GROUP
68 BD	15 K 34	POWEN-WAFAPOMP GROUP
68 BD	25 K 41, 25 K 40	POWEN-WAFAPOMP GROUP
72 BD	12 K 28	POWEN-WAFAPOMP GROUP
80 BD	20 S 28 Wz	POWEN-WAFAPOMP GROUP
80 BD	20 W 39	POWEN-WAFAPOMP GROUP
81(92) BD	W 24 P	POWEN-WAFAPOMP GROUP
85 BD	40 B33, 40 B 36	POWEN-WAFAPOMP GROUP
95(100) BD	35 W 50, 35 W 55	POWEN-WAFAPOMP GROUP
110 BD	30 WK 45	POWEN-WAFAPOMP GROUP
115 BD	35 B 40, 35 B 50	POWEN-WAFAPOMP GROUP
140 BD	40 B 61, 40 B 75	POWEN-WAFAPOMP GROUP
140 BD	40 B 80	POWEN-WAFAPOMP GROUP
140 BD	50 B 40, 50 B 63	POWEN-WAFAPOMP GROUP
145 BD	50 BS 50	POWEN-WAFAPOMP GROUP

## Materials

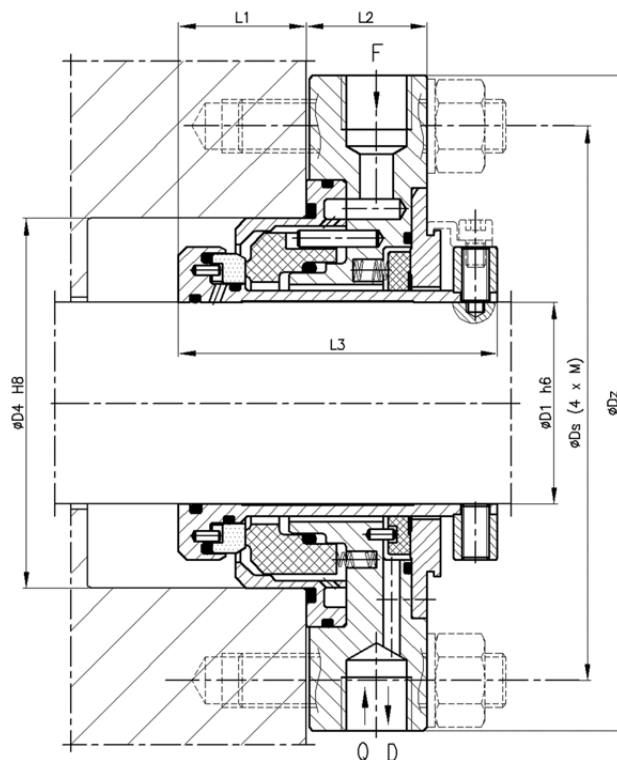
Part	Code
Stationary and rotating rings	A, B, U, Q
Secondary, flexible seals	E, P, K, V
Spring	G, M
Other metal parts	F, G

Operating limits*		
Speed	$v_{max}$	15 m/s
Temperature*		Pressure
$t_{max} = -40 \div 80 \text{ } ^\circ\text{C}$		$p_{max} = 3.5 \text{ MPa}$
$t_{max} = 80 \div 130 \text{ } ^\circ\text{C}$		$p_{max} = 3.1 \text{ MPa}$
$t_{max} = 130 \div 180 \text{ } ^\circ\text{C}$		$p_{max} = 2.8 \text{ MPa}$
$t_{max} = 180 \div 250 \text{ } ^\circ\text{C}$		$p_{max} = 2.2 \text{ MPa}$

\* - see note on page 3.



- Single compact (cartridge) mechanical seal
- Multi-spring, balanced, dual-directional
- Design according to EN ISO 21049 (API 682): type A, category 2 or 3, arrangement 1, configuration 1CW-FL (with a floating carbon throttle bushing)



## Features

- compact construction, it fits also into smaller pump stuffing boxes
- easy assembly and disassembly of the mechanical seal
- high resistance to deformation that could be caused by high pressure and high temperature
- very low emission of volatile substances into the atmosphere
- low friction due to the optimal form of main sealing rings
- carbon throttle ring causing no spark, blocks the emission of volatile substances into the atmosphere eg. with gas installation (nitrogen) according to API 682 and separates leakage into the secure zone – torch
- the seal connections enable to build the working arrangements with auxiliary installations according to API 682 Plan 11, 12, 13, 21, 22

## Dimensions (mm)

D1	D4	Ds	Dz	L1	L2	L3	M
40	90	125	160	38	36	95	12
50	100	140	180	38	36	95	16
60	120	160	200	38	36	95	16
70	130	170	210	38	36	95	16
80	140	180	220	38	36	95	16
90	160	205	245	38	36	95	20
100	170	215	255	40	36	100	20
110	180	225	265	40	36	100	20

Other dimensions are available as an option. Please contact ANGA.

## Application

BP is a universal mechanical seal designed especially for pump installations for fluid hydrocarbons with small density and high pressure occurring in refineries, in the petrochemical and chemical industries.

This mechanical seal is intended for the following mediums:

propane-butane, ethanol, acetone, cumene, ethylenic hydrocarbons (olefins  $C_nH_{2n}$ ), with high purity and having no abrasive particles.

The mechanical seal BP can seal also pure chemical substances, some organic acids and heavy hydrocarbons.

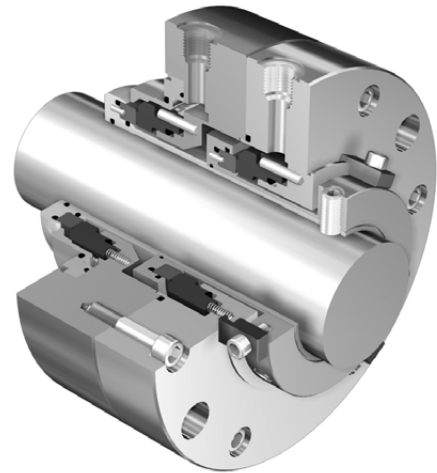
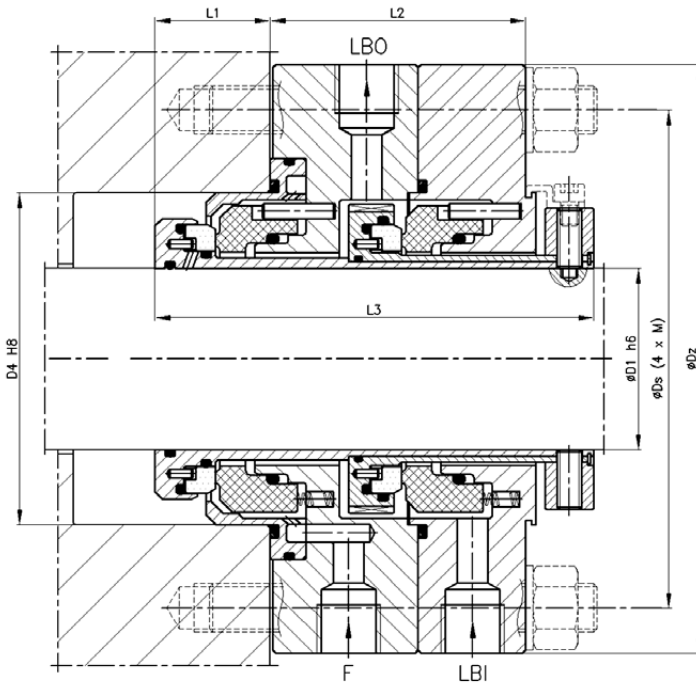
## Materials

Part	Code
Rotating ring	A, Q, U
Stationary ring	Q, U
Secondary, flexible seals	E, V, K
Spring	M
Other metal parts	G, M

- Double compact (cartridge) mechanical seal
- Multi-spring, balanced, dependent on the direction of shaft rotation
- Design according to EN ISO 21049 (API 682): type A, category 2 or 3, arrangement 2 or 3 configuration 2CW-CW or 3CW-FB

Operating limits*		
Speed	V <sub>max</sub>	15 m/s
Temperature*		Pressure
t <sub>max</sub> = - 40 ÷ 80 °C		p <sub>max</sub> = 3.5 MPa
t <sub>max</sub> = 80 ÷ 130 °C		p <sub>max</sub> = 3.1 MPa
t <sub>max</sub> = 130 ÷ 180 °C		p <sub>max</sub> = 2.8 MPa
t <sub>max</sub> = 180 ÷ 250 °C		p <sub>max</sub> = 2.2 MPa

\* - see note on page 3.



## Features

- compact construction, it fits also into smaller pump stuffing boxes
- high operating safety, the seal eliminates explosion hazards by having a tandem seal arrangement what restricts the emission of volatile substances into the atmosphere
- high resistance to deformation that could be caused by high pressure and high temperature, greater sealing ring durability thanks to additional cooling
- forced circulation of quench (cooling) fluid in accordance with API 682 Plan 54
- low friction due to the optimal form of main sealing rings
- possibility to monitor the seals working conditions by quench fluid control
- the seal connections enable to build the working arrangements with auxiliary installations according to API 682 Plan 11/52, 11/53, 12/52, 12/53
- the pump does not stop working also after a failure of the main seal
- easy assembly and disassembly of the mechanical seal

## Application

BPD is a universal mechanical seal designed especially for pump installations for the fluid hydrocarbons with small density and high pressure occurring in the refineries, in the petrochemical and chemical industries. This mechanical seal is intended for the following mediums: propane-butane, ethanol, acetone, cumene, ethylenic hydrocarbons (olefins C<sub>n</sub>H<sub>2n</sub>), with high purity and having no abrasive particles.

The mechanical seal BPD can seal also pure chemical substances, some organic acids and heavy hydrocarbons.

The mechanical seals type BPD eliminate hazardous emissions of process medium into the atmosphere by using a tandem seal arrangement according to API 682 type 2 with cooling – separating installation and quench thermosiphon vessel.

## Materials

Part	Code
Rotating ring	A, Q, U
Stationary ring	Q, U
Secondary, flexible seals	E, V, K
Spring	M
Other metal parts	G, M

## Dimensions (mm)

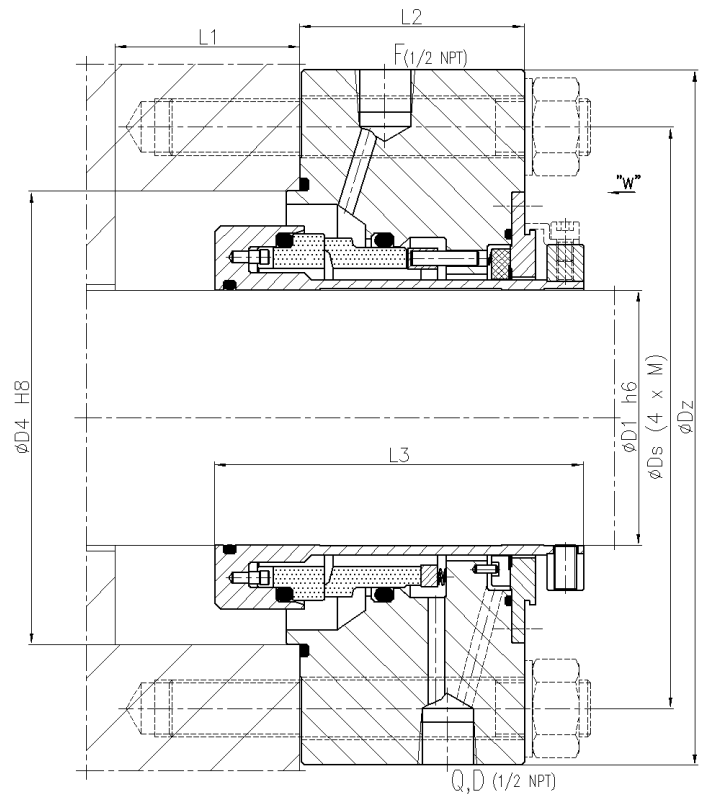
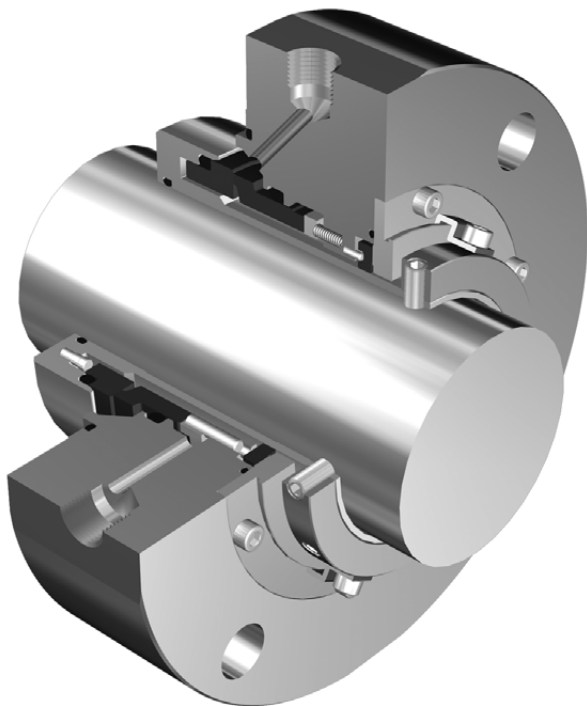
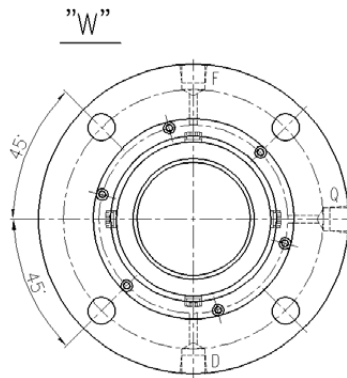
D1	D4	Ds	Dz	L1	L2	L3	M
40	90	125	160	38	76,5	135	12
50	100	140	180	38	84,5	145	16
60	120	160	200	38	84,5	145	16
70	130	170	210	38	84,5	145	16
80	140	180	220	38	84,5	145	16
90	160	205	245	38	84,5	145	20
100	170	215	255	40	84,5	150	20
110	180	225	265	40	84,5	150	20

Other dimensions are available as an option. Please contact ANGA.

Operating limits*		
Pressure	$p_{max}$	4.2 MPa
Temperature	$t_{max}$	180 °C
Speed	$v_{max}$	20 m/s

\* - see note on page 3.

- Single compact (cartridge) mechanical seal
- Multi-spring, balanced, dual-directional
- Design according to EN ISO 21049 (API 682): type A, category 2 or 3, arrangement 1, configuration 1CW-FL (with a floating carbon throttle bushing)



## Dimensions (mm)

D1	D4	DS	DZ	L1	L2	L3	M
20	70	105	140	25	73	117	M12
30	80	115	150	25	73	117	M12
40	90	125	160	25	73	117	M12
50	100	140	180	25	73	117	M16
60	120	160	200	30	79	130	M16
70	130	170	210	30	79	130	M16
80	140	180	220	30	79	130	M16
90	160	205	245	30	79	130	M20
100	170	215	255	35	79	145	M20
110	180	225	265	35	79	145	M20

Other dimensions are available as an option. Please contact ANGA.

## Application

BU is a single cartridge mechanical seal designed to work with media containing abrasive particles, especially with crude oil and impure hydrocarbons. BU seal requires an auxiliary system according to EN ISO 21049 (API 682), Plans: 11/61, 11/62, 12/61, 12/62, 13/61, 13/62.

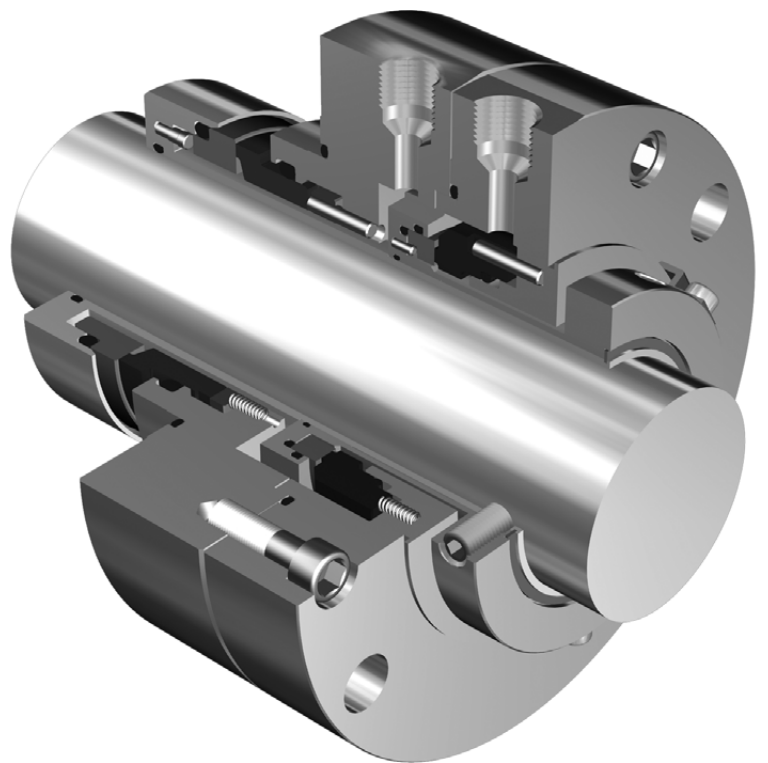
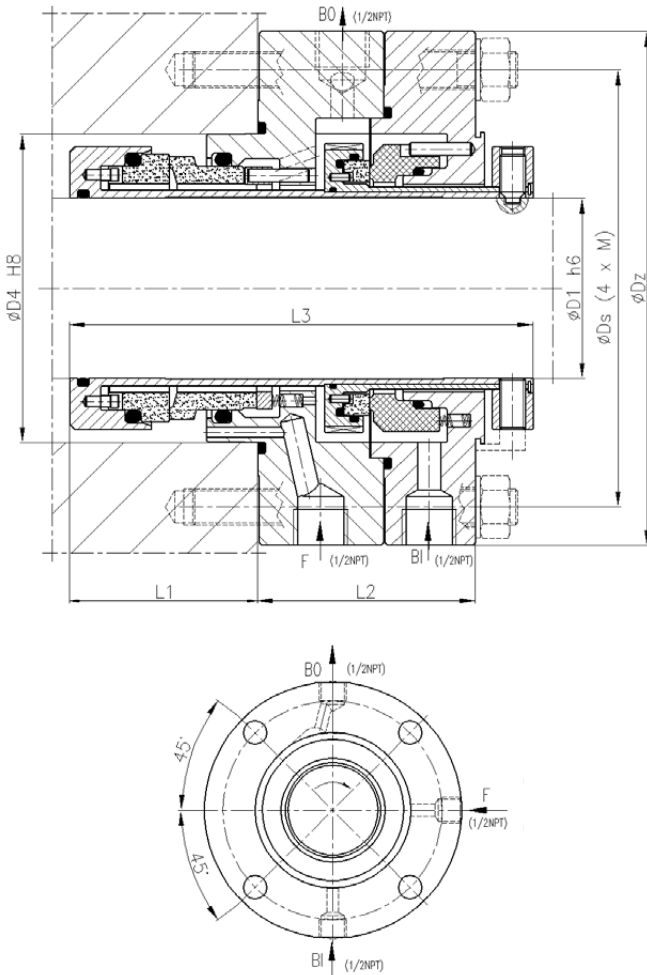
## Materials

Part	Code
Rotating ring	Q, U
Stationary ring	A, B, Q, U
Secondary, flexible seals	V, K, M
Spring	M
Other metal parts	G, M

- Double compact (cartridge) mechanical seal
- Multi-spring, balanced, dependent on the direction of shaft rotation
- Design according to EN ISO 21049 (API 682): type A, category 2 or 3, arrangement 2 or 3, configuration 2CW-CW or 3CW-FB

Operating limits*		
Pressure	$p_{max}$	4.2 MPa
Temperature	$t_{max}$	180 °C
Speed	$v_{max}$	20 m/s

\* - see note on page 3.



## Application

BUV is a double cartridge mechanical seal designed to work with media containing abrasive particles, especially with crude oil and impure hydrocarbons.

BUV seal requires an auxiliary system according to EN ISO 21049 (API 682), Plans: 11/52, 11/53A, 12/52, 12/53A, 13/52, 13/53A.

## Materials

Part	Code
Rotating ring	Q, U
Stationary ring	A, B, Q, U
Secondary, flexible seals	V, K, M
Spring	M
Other metal parts	G, M

## Dimensions (mm)

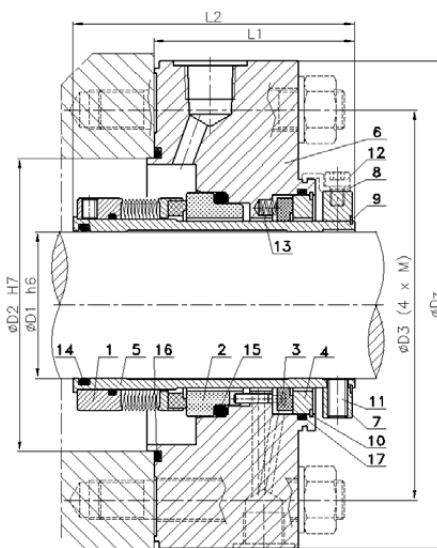
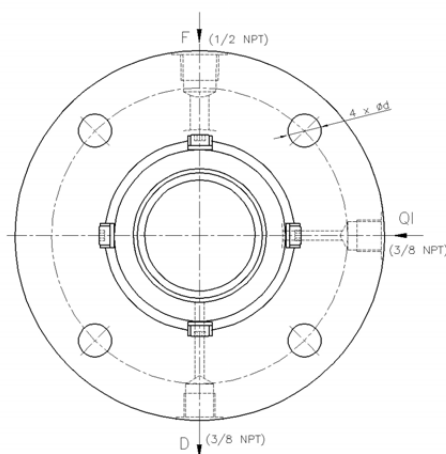
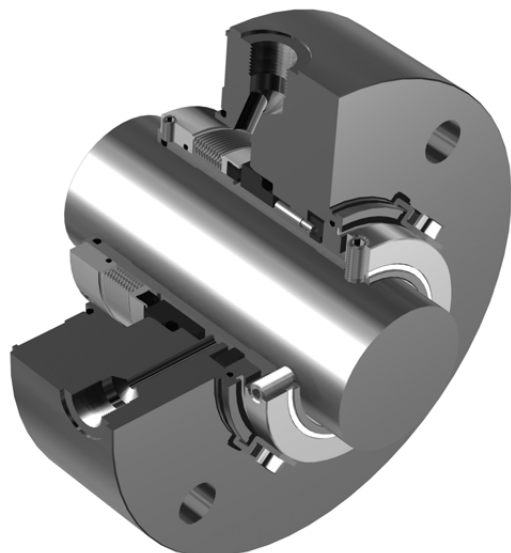
D1	D4	DS	DZ	L1	L2	L3	M
20	70	105	140	45	66	130	M12
30	80	115	150	50	61	130	M12
40	90	125	160	55	56	130	M12
50	100	140	180	55	66	140	M16
60	120	160	200	55	76	150	M16
70	130	170	210	60	88	170	M16
80	140	180	220	65	88	175	M16
90	160	205	245	65	93	180	M20
100	170	215	255	65	98	185	M20
110	180	225	265	65	98	185	M20

Other dimensions are available as an option. Please contact ANGA.

Operating limits*		
Pressure	$p_{max}$	2,0 MPa
Temperature	$t_{max}$	200 °C
Speed	$v_{max}$	20 m/s

\* - see note on page 3.

- Single compact (cartridge) mechanical seal
- Metal bellows
- Multi-spring, balanced, dual-directional
- Design according to EN ISO 21049 (API 682): type B, category 1 (any glands) or 2 (gland dimensions acc. to ISO 13709), arrangement 1, configuration 1CW-FL



## Legend

- |                     |                       |                     |
|---------------------|-----------------------|---------------------|
| 1. Rotary part E1   | 7. Clamp ring EP      | 13. Spring          |
| 2. Stationary ring  | 8. Distance plate EP. | 14. O-ring          |
| 3. Throttle ring EP | 9. Retaining ring     | 15. O-ring          |
| 4. Thrust ring EP   | 10. Retaining ring    | 16. O-ring          |
| 5. Sleeve EP        | 11. Set screw         | 17. O-ring          |
| 6. Cover EP         | 12. Hex screw         | F – flushing / vent |
|                     |                       | Q – quench          |
|                     |                       | D - drain           |

## Features

- implementation of non-sparking carbon graphite throttle ring enables blocking the emission of volatile substances into the environment and separating potential outflow from the atmosphere (to the safe zone)
- compact construction, it fits also into smaller pump stuffing boxes
- cartridge design provides easy and quick assembly and disassembly without setting the fixing dimensions
- very low emission of volatile substances into the atmosphere
- supplied seal is fully assembled which excludes possible mistakes during the assembly process

## Dimensions (mm)

D1	D4	DS	DZ	L1	L2	M
20	70	105	140	82	105	M12x1,75
30	80	115	150	82	105	M12x1,75
40	90	125	160	82	105	M12x1,75
50	100	140	190	82	110	M16x2,0
60	120	160	200	82	115	M16x2,0
70	130	170	210	82	115	M16x2,0
80	140	180	220	87	125	M16x2,0
90	160	205	250	87	125	M20x2,5
100	170	215	260	87	125	M20x2,5
110	180	225	270	87	125	M20x2,5

Other dimensions are available as an option. Please contact ANGA.

## Application

EP is designed to operate with hydrocarbons present in oil refining processes. It is designed according to EN ISO 21049 (API 682) recommendations.

EP seal is compatible with API 682 Plans:

- at the process side – Plans: 11, 12, 13, 23, 31, 32
- at the atmosphere side – Plans: 61, 62, 65.

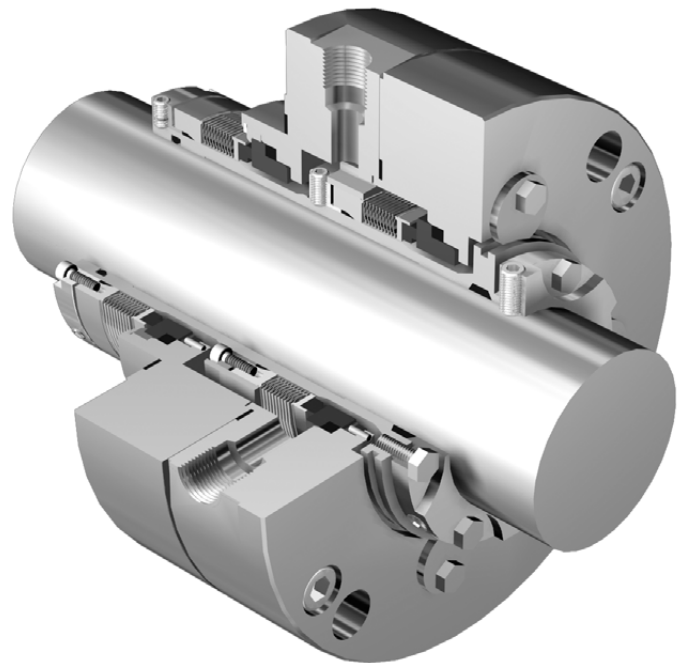
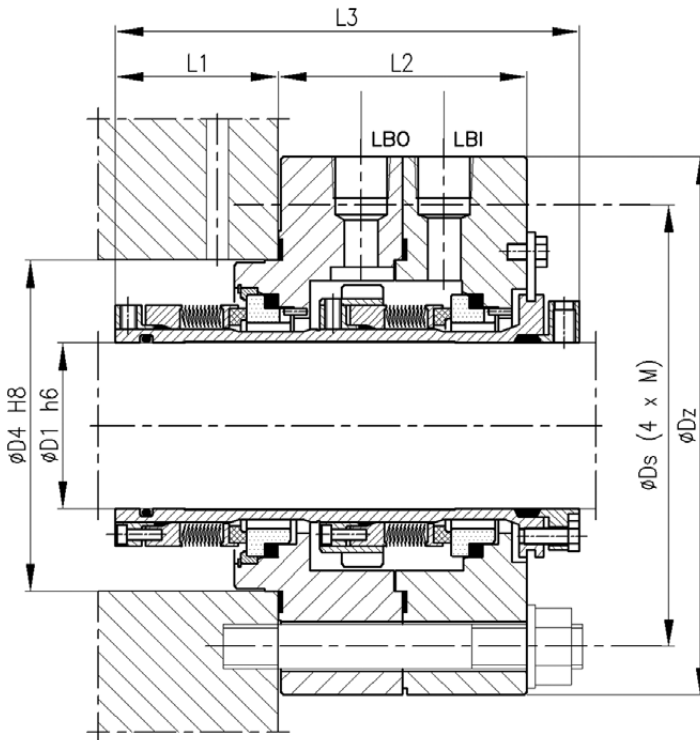
## Materials

Part	Code
Rotating ring	A, B, Q
Stationary ring	Q, U
Secondary, flexible seals	E, K, V
Spring	M
Other metal parts	G

- Double compact (cartridge) mechanical seal
- Metal bellows
- Multi-spring, balanced, dependent on the direction of rotation
- Design according to EN ISO 21049 (API 682): type C, category 2 or 3, arrangement 2 or 3, configuration 2CW-CW or 3CW-FB

Operating limits*		
Pressure	$p_{max}$	1.2 MPa
Temperature	$t_{max}$	400 °C
Speed	$v_{min}$	25 m/s

\* - see note on page 3.



## Dimensions (mm)

D1	D4	Ds	Dz	L1	L2	L3	M
20	70	105	140	48	76	140	12
30	80	115	150	53	78	147	12
40	90	125	160	58	76	150	12
50	100	140	180	54	90	160	16
60	120	160	200	59	89	166	16
70	130	170	210	63	86	168	16
80	140	180	220	68	85	172	16
90	160	205	245	63	92	177	20

Other dimensions are available as an option. Please contact ANGA.

## Application

EPD is a double mechanical seal with metal bellows designed to work with hot hydrocarbons in the petroleum refining processes.

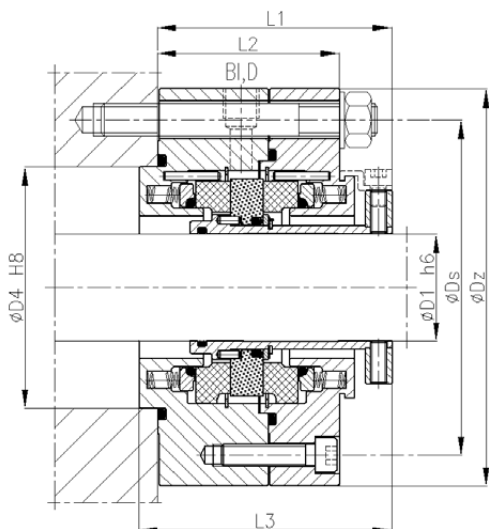
The seal requires the application of auxiliary installations according to EN ISO 21049 (API 682) Plan 52 or Plan 53.

## Materials

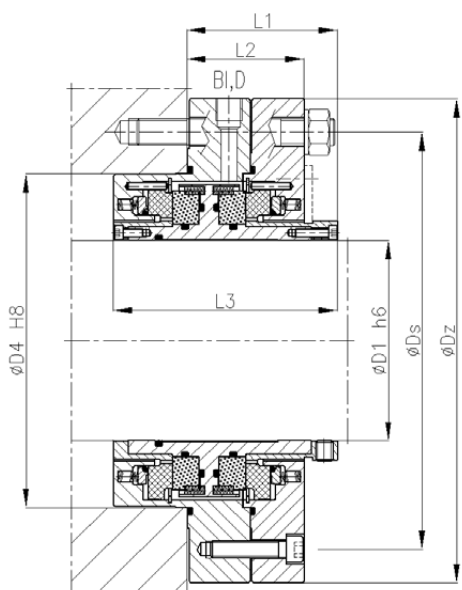
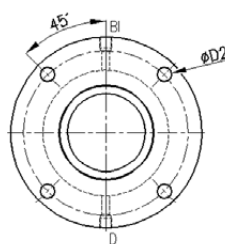
Part	Code
Rotating ring	A, B, Q
Stationary ring	Q
Secondary, flexible seals	G
Welded bellows	G, M, T
Other metal parts	T, M

Operating limits*		
Pressure	$p_{max}$	2,0 MPa
Temperature	$t_{max}$	170 °C
Speed	n	1000 ÷ 4000 obr/min

\* - see note on page 3.



**For diameters  
90 ÷ 160 mm**



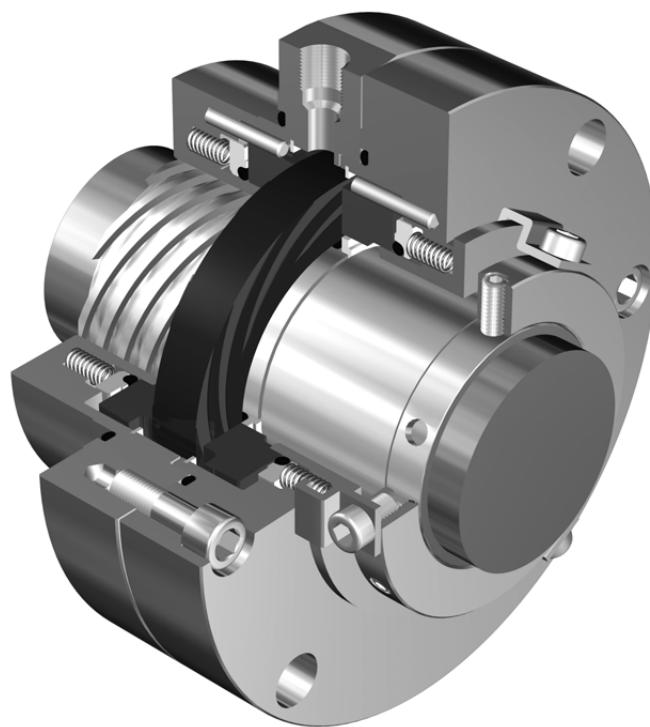
**For diameters  
40 ÷ 80 mm**

## Dimensions (mm)

D1	D2	D4	Ds	Dz	L1	L2	L3
40	14	90	125	150	87	67,5	94
50	18	100	140	170	87	67,5	94
60	18	120	160	190	87	67,5	94
70	18	130	170	200	87	67,5	94
80	18	140	180	210	87	67,5	94
90	22	160	205	240	85	67	125
100	22	170	215	250	85	67	125
110	22	180	225	260	85	67	125
120	22	200	250	290	90	70	134
130	22	210	260	300	90	70	134
140	22	220	270	310	90	70	134
150	22	230	280	320	90	70	134
160	22	240	290	330	90	70	134

Other dimensions are available as an option. Please contact ANGA.

- Double gas-lubricated seal "face to face"
- Compact (cartridge) design
- Dependent on the direction of rotation:  
**GK4** - clockwise,  
**GK3** - counterclockwise
- Multi-spring
- Requires a barrier gas supply
- Non-contacting operation



## Application

GK4 seals are intended to be used in pumps and compressors operating in explosive environment or handling toxic and hazardous substances. The main areas of their application are: chemical, petrochemical, refinery and coke industries, transportation of natural and industrial gases. Sealed substances could be gases or vapors of flammable or aggressive liquids, e.g ammonia, ethylene, acetone, hydrogen chloride, hydrogen sulphide, etc.

## Materials

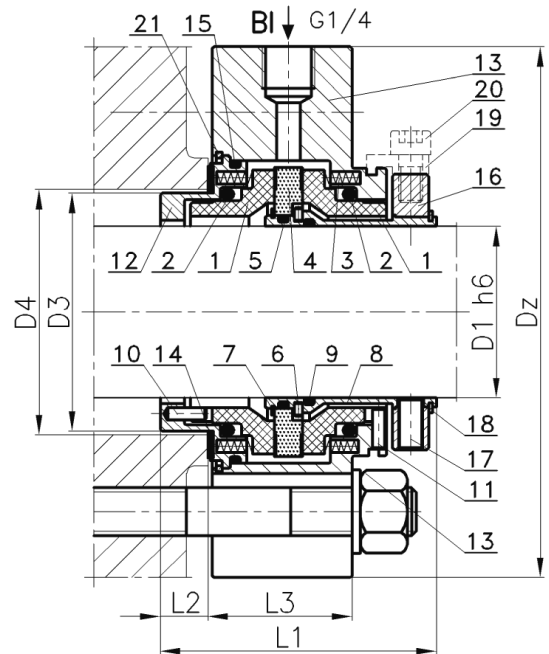
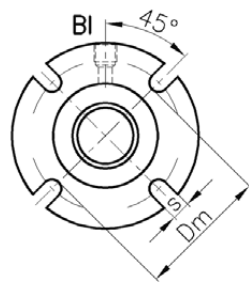
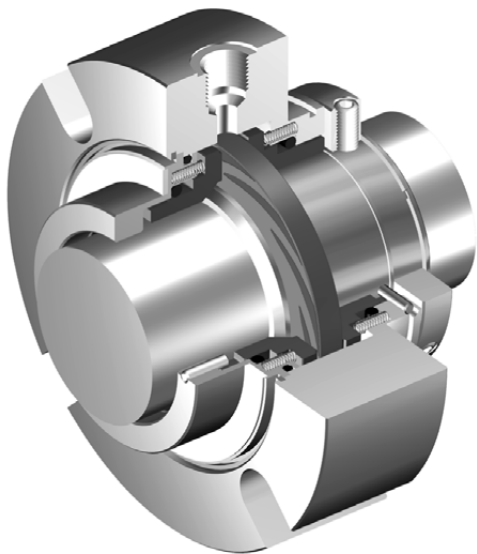
Part	Code
Rotating ring	A, B
Stationary ring	Q, U
Secondary, flexible seals	E, K, V
Spring	M
Other metal parts	G



- Double gas-lubricated seal “face to face”
- Compact (cartridge) design
- Dependent on the direction of rotation:
  - GFR - clockwise,
  - GFL - counterclockwise
- Multi-spring
- Requires a barrier gas supply
- Non-contacting operation

Operating limits*		
Pressure	$p_{max}$	1.2 MPa
Temperature	$t_{max}$	200 °C
Speed	$v_{min}$	1 m/s

\* - see note on page 3.



## Features

- very long lifetime and long MTBF (mean time between failures),
- no emission of harmful medium into the atmosphere – they meet stringent ecological requirements in the range of harmful substances,
- possible operation in mediums, which do not form a lubricating film,
- ensures complete leak tightness of a pump (also in the case of a barrier gas pressure failure, the seal continues operation in the contact mode).

## Dimensions (mm)

D1	D4	Dm	Dz	L1	L2	L3	S
22	42	66	98	75,5	17	36,5	11
25	45	69	100	75,5	17	36,5	11
32	52	76	108	75,5	17	36,5	11
35	55	79	110	75,5	17	36,5	11
40	60	84	120	75,5	17	36,5	14
45	65	89	118	75,5	17	36,5	14
48	68	93	130	75,5	17	36,5	14
55	75	100	140	75,5	17	36,5	14
75	100	124	170	79,0	15	42,0	18

Other dimensions are available as an option. Please contact ANGA.

## Legend

- |                    |                     |
|--------------------|---------------------|
| 1. Rotating rings  | 11. Locating pin    |
| 2. O-ring          | 12. Insert of cover |
| 3. Springs         | 13. Cover           |
| 4. Stationary ring | 14. Flat gasket     |
| 5. O-ring          | 15. Hex screw       |
| 6. Driving pin     | 16. Clamp ring      |
| 7. Protective ring | 17. Set screws      |
| 8. Sleeve          | 18. Protective ring |
| 9. O-ring          | 19. Assembly arm    |
| 10. Locating pin   | 20. Hex screws      |
|                    | 21. Protective ring |

## Application

GF seals are destined for toxic, corrosive, explosive, abrasive mediums, dangerous for human health or environment and process gases used in chemical, petrochemical, pharmaceutical applications. Recommended when particular cleanness of a product should be assured and when frictional heat causes changes in medium properties.

## Materials

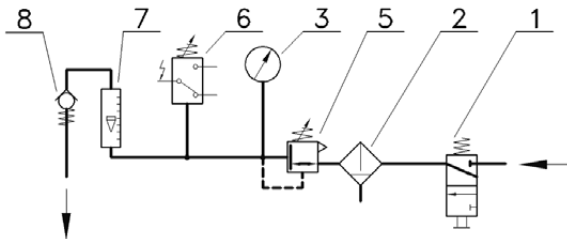
Part	Code
Rotating ring	Q, U
Stationary ring	A, B
Secondary, flexible seals	E, V, K
Spring	G
Other metal parts	G

# Supply unit

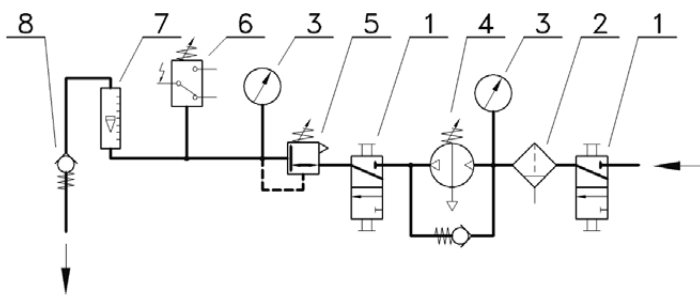
Supply unit is a necessary constant element of gas lubricated seals.

The units are designed as single or multiple systems (e.g. for two seals or more, supplied from one unit).

## Supply unit without pressure amplifier

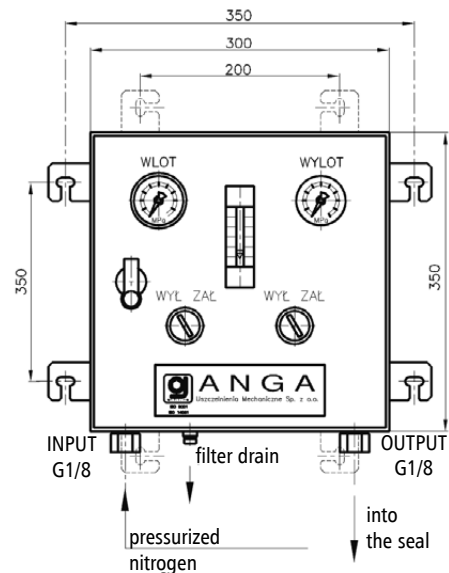


## Supply unit with pressure amplifier (x2 or x4)

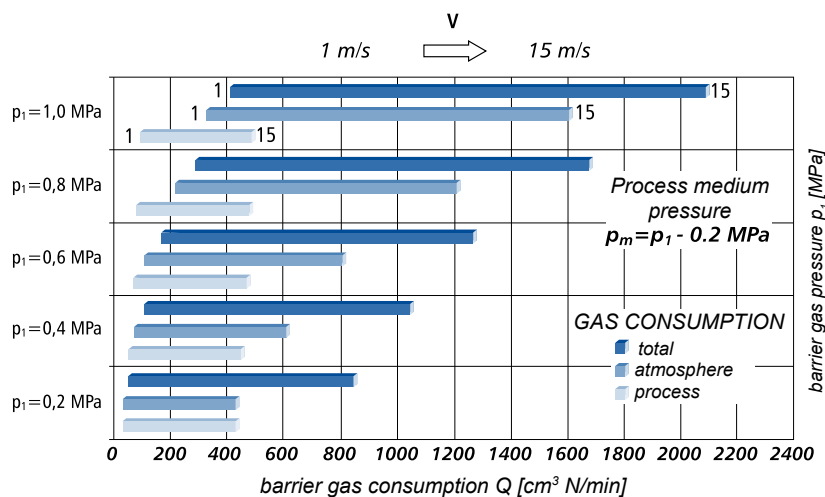


## Description of components of the supply unit

- |                            |                                       |
|----------------------------|---------------------------------------|
| 1. Cut-off valve           | 6. Air-operated electromagnetic relay |
| 2. Filter                  | 7. Flowmeter                          |
| 3. Pressure gauge          | 8. Non-return valve                   |
| 4. Hydraulic amplifier     |                                       |
| 5. Pressure reducing valve |                                       |



## Example of barrier gas demand $Q=f(p,v)$



## The supply unit provides

- filtered barrier gas from solid contamination,
- control and adjustment of barrier gas flow,
- signaling of critical conditions (monitoring),
- barrier gas amplification (if required) in proportion 1:2 or 1:4 in relation to the actual pressure in the existing industrial network.

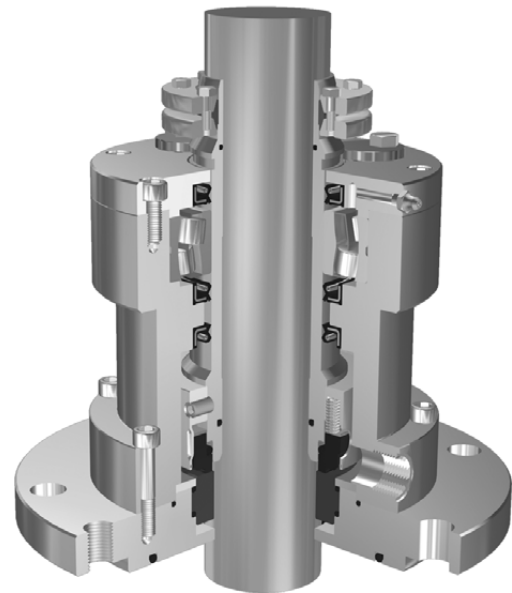
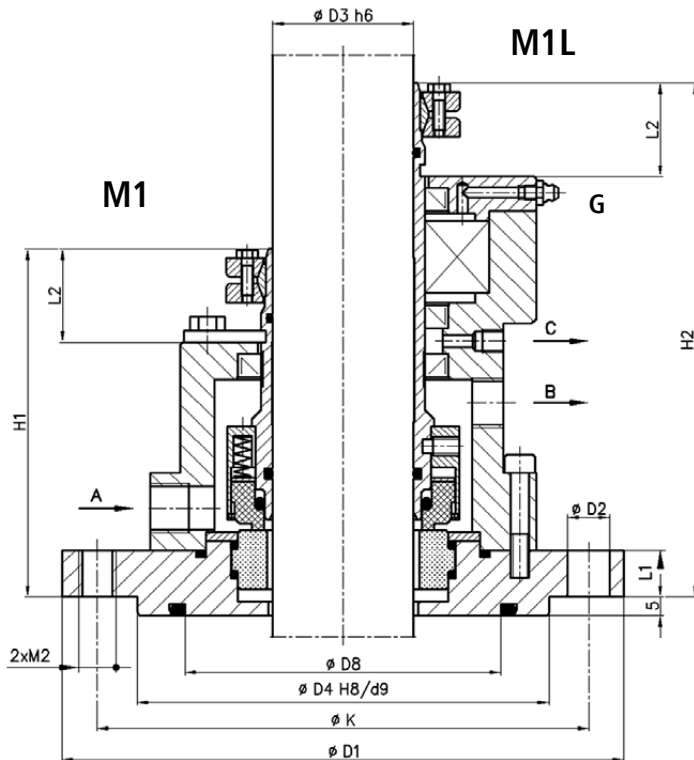
## Dimensions, materials

With regard to specific operation of gas lubricated seals, supply unit components, materials used and dimensions are to be agreed with Customer every time. Please contact ANGA.

- Single mixer mechanical seal
- Balanced
- Multi-spring
- Dual directional
- Either without bearing (M1) or with integral bearing (M1L)

Operating limits*		
Pressure	$P_{max}$	0,6 MPa
Temperature	$t_{max}$	200 °C
Speed	$V_{max}$	4 m/s

\* - see note on page 3.



### CONNECTORS

- A – coolant inlet
- B – coolant outlet
- C – leakage outlet
- G – grease point

### Materials

Part	Code
Rotating ring	A, B, Q
Stationary ring	Q, V
Secondary, flexible seals	P, V, E, K
Spring	G, M
Other metal parts	G, M

## Application

Type M1, M1L mechanical seals are applied to seal top entry drives in agitators, mixers or blenders in cases when nonaggressive and non-hazardous media are sealed with the use of cooling-flushing liquid preventing from dry running. They can be made of materials that are approved for use in the pharmaceutical and food industries.

## Dimensions (mm)

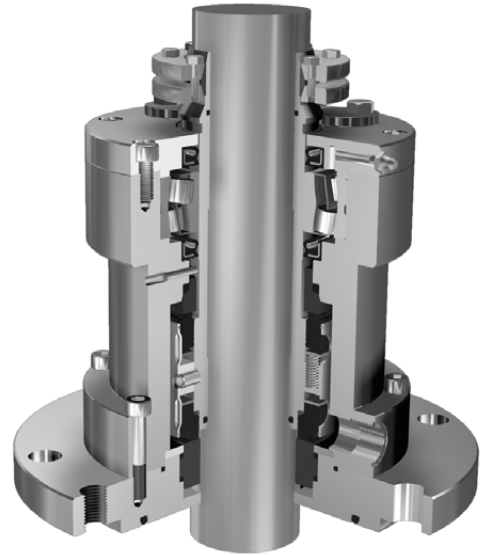
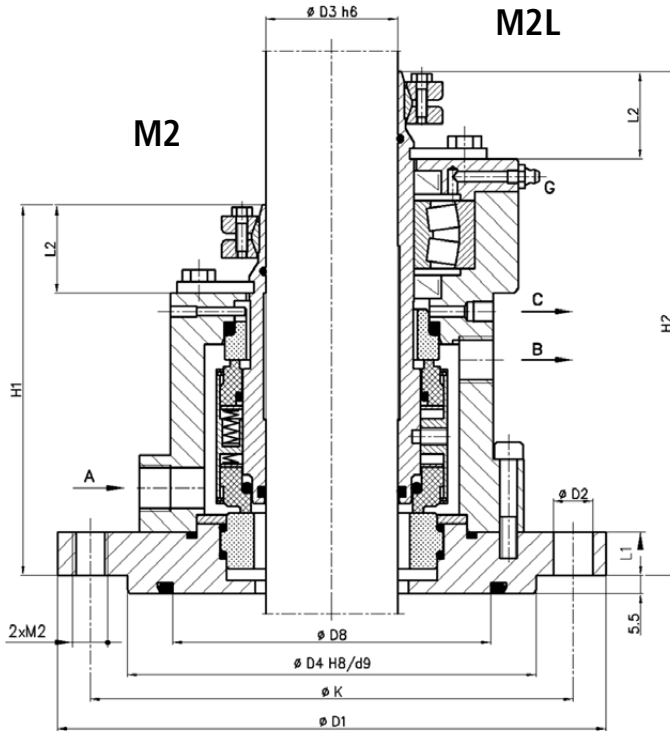
D3	D1	N x D2	D4	D8	K	L1	L2	M2	M1 H1	M1L H2	A,B	C
30	175	4 x 18	110	70	145	20	40	M16	130	185	G3/8	G1/8
40	175	4 x 18	110	70	145	20	40	M16	130	190	G3/8	G1/8
50	240	8 x 18	176	135	210	20	40	M16	140	210	G1/2	G1/8
60	240	8 x 18	176	135	210	20	40	M16	140	210	G1/2	G1/8
70	240	8 x 18	176	135	210	20	45	M16	150	225	G1/2	G1/8
80	275	8 x 22	204	155	240	20	50	M20	160	245	G1/2	G1/8
90	275	8 x 22	204	155	240	20	50	M20	160	255	G1/2	G1/8
100	305	8 x 22	234	190	270	20	50	M20	160	255	G1/2	G1/8
110	305	8 x 22	234	190	270	20	55	M20	170	260	G1/2	G1/8
125	330	8 x 22	260	215	295	20	55	M20	170	270	G1/2	G1/8

Other dimensions are available as an option. Please contact ANGA.

Operating limits*		
Pressure	$p_{max}$	1,0 MPa
Temperature	$t_{max}$	200°C
Speed	$v_{max}$	8 m/s

\* - see note on page 3.

- Single mixer mechanical seal
- Unbalanced
- Multi-spring
- Dual directional
- Either without bearing (M2) or with integral bearing (M2L)



### CONNECTIONS

A – coolant inlet  
B – coolant outlet

C – leakage outlet  
G – grease point

### Materials

Part	Code
Rotating ring	A, B, Q
Stationary ring	Q, V
Secondary, flexible seals	P, V, E, K
Spring	G, M
Other metal parts	G, M

### Application

Type M2, M2L mechanical seals are applied to seal top entry drives in agitators, mixers or blenders in cases when chemically aggressive and environmentally hazardous products are processed. The seals are adapted for operating with low-pressure installations of barrier or flushing-cooling liquids.

They can be made of materials that are approved for use in the pharmaceutical and food industries.

### Dimensions (mm)

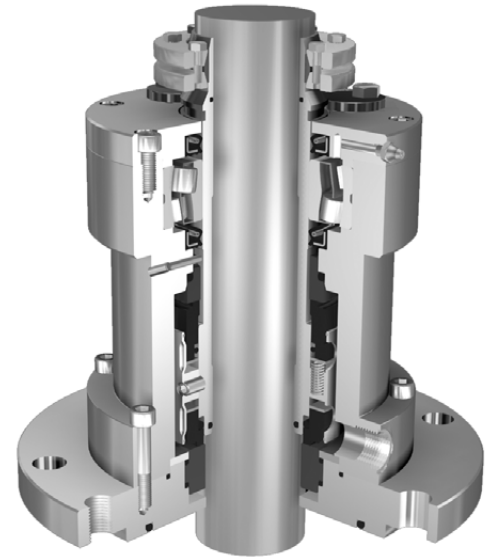
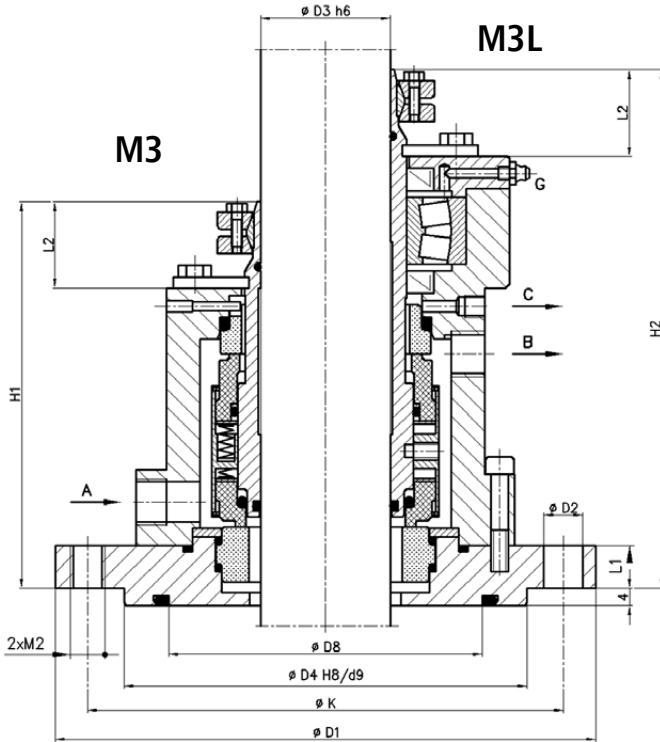
									M2	M2L		
D3	D1	N x D2	D4	D8	K	L1	L2	M2	H1	H2	A,B	C
30	175	4 x 18	110	70	145	20	40	M16	150	200	G3/8	G1/8
40	175	4 x 18	110	70	145	20	40	M16	160	210	G3/8	G1/8
50	240	8 x 18	176	135	210	20	40	M16	175	230	G1/2	G1/8
60	240	8 x 18	176	135	210	20	40	M16	175	230	G1/2	G1/8
70	240	8 x 18	176	135	210	20	45	M16	180	240	G1/2	G1/8
80	275	8 x 22	204	155	240	20	50	M20	180	260	G1/2	G1/8
90	275	8 x 22	204	155	240	20	50	M20	185	270	G1/2	G1/8
100	305	8 x 22	234	190	270	20	50	M20	190	265	G1/2	G1/8
110	305	8 x 22	234	190	270	20	55	M20	195	270	G1/2	G1/8
125	330	8 x 22	260	215	295	20	55	M20	205	290	G1/2	G1/8

Other dimensions are available as an option. Please contact ANGA.

- Double mixer mechanical seal
- Balanced
- Dual directional
- Either without bearing (M3) or with integral bearing (M3L)

Operating limits*		
Pressure	$p_{max}$	2.5 MPa
Temperature	$t_{max}$	-20 °C do 200 °C
Speed	$v_{max}$	4 m/s

\* - see note on page 3.



### CONNECTIONS

- A – coolant inlet  
 B – coolant outlet  
 C – leakage outlet  
 G – grease point

### Materials

Part	Code
Rotating ring	A, B, Q
Stationary ring	Q, V
Secondary, flexible seals	P, V, E, K
Spring	G, M
Other metal parts	G, M

### Application

Type M3, M3L mechanical seals are applied to seal top entry drives in agitators, mixers or blenders in cases when chemically aggressive and environmentally hazardous products are processed. The seals are adapted for operating with low-pressure installations of barrier or flushing-cooling liquids.

They can be made of materials that are approved for use in the pharmaceutical and food industries.

### Dimensions (mm)

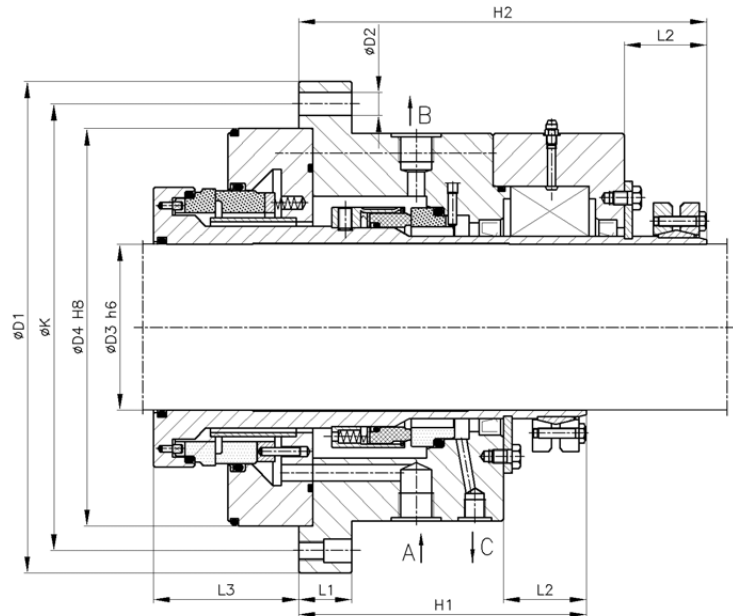
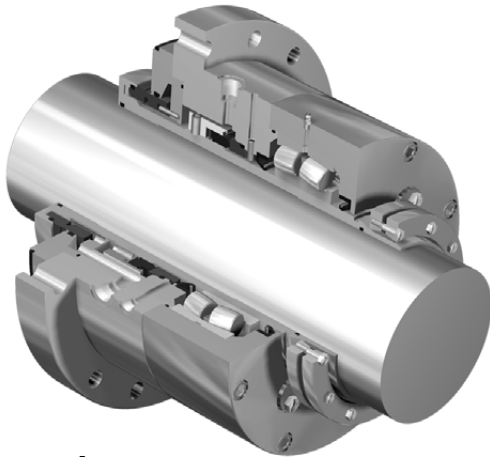
D3	D1	N x D2	D4	D8	K	L1	L2	M2	M3	M3L	A,B	C
30	175	4 x 18	110	70	145	20	40	M16	165	210	G3/8	G1/8
40	175	4 x 18	110	70	145	20	40	M16	170	220	G3/8	G1/8
50	240	8 x 18	176	135	210	20	40	M16	185	240	G1/2	G1/8
60	240	8 x 18	176	135	210	20	40	M16	185	240	G1/2	G1/8
70	240	8 x 18	176	135	210	20	45	M16	190	250	G1/2	G1/8
80	275	8 x 22	204	155	240	20	50	M20	190	270	G1/2	G1/8
90	275	8 x 22	204	155	240	20	50	M20	195	280	G1/2	G1/8
100	305	8 x 22	234	190	270	20	50	M20	200	275	G1/2	G1/8
110	305	8 x 22	234	190	270	20	55	M20	205	280	G1/2	G1/8
125	330	8 x 22	260	215	295	20	55	M20	210	295	G1/2	G1/8

Other dimensions are available as an option. Please contact ANGA.

Operating limits*		
Pressure	$p_{max}$	1.0 MPa
Temperature	$t_{max}$	200 °C
Speed	$v_{max}$	10 m/s

\* - see note on page 3.

- Double mixer mechanical seal
- Design with horizontal axis of rotation
- Unbalanced
- Multi-spring
- Dual directional
- Without bearing (M4) or with integral bearing (M4L)



## Materials

Part	Code
Rotating ring	A, B, Q
Stationary ring	Q, V
Secondary, flexible seals	E, V, K
Spring	M
Other metal parts	G, M

### CONNECTIONS

A – coolant inlet  
B – coolant outlet

C – leakage outlet  
G – grease point

## Application

The M4 and M4L mechanical seals are designed for sealing shafts of mixers and reactors in which thick, high viscosity products as well as chemically aggressive and environmentally hazardous ones are processed. The seals are adapted for operating with low-pressure installations of barrier or flushing-cooling fluids.

M4 seals have horizontal or vertical rotation axis and in M4L embodiment they play the role of the bearing shaft unit. The presence of barrier liquid enables seal operation in medium vapours only („dry” running) and prevents the product from getting out into the atmosphere.

They can be made of materials that are approved for use in the pharmaceutical and food industries.

## Dimensions (mm)

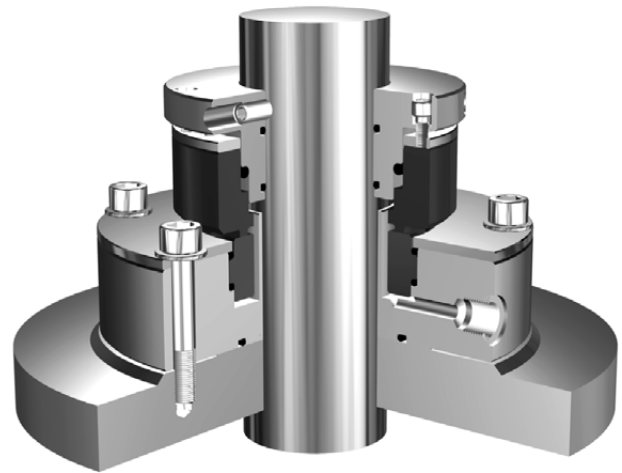
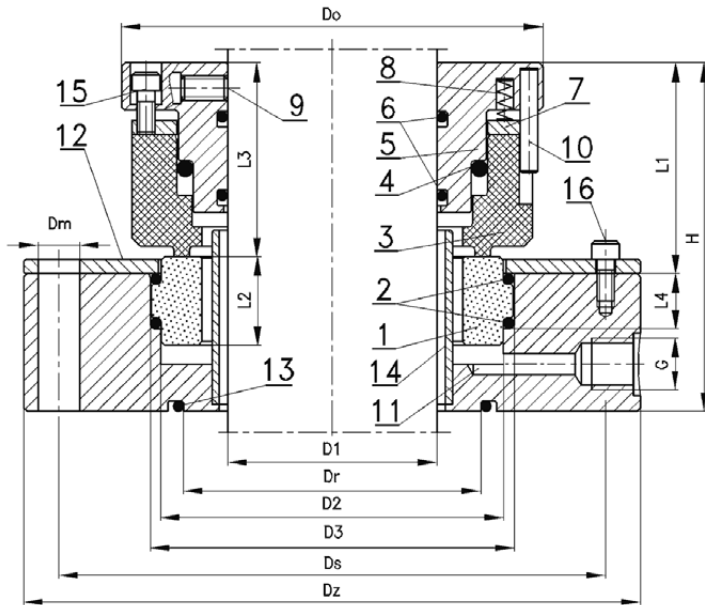
								M4	M4L		
D3	D1	N x D2	D4	K	L1	L2	L3	H1	H2	A,B	C
50	217	8 x 12	170	195	20	40	82	121	178	G3/8	G1/8
60	227	8 x 12	180	205	20	40	82	130	187	G3/8	G1/8
70	255	8 x 14	195	230	25	45	82	140	202	G1/2	G1/8
80	265	8 x 14	210	240	25	50	82	155	235	G1/2	G1/8
90	285	8 x 14	230	260	25	50	82	170	250	G1/2	G1/8
100	295	8 x 14	240	270	25	50	82	180	260	G1/2	G1/8
110	315	8 x 14	255	290	25	55	82	186	270	G1/2	G1/8
120	335	8 x 16	265	305	30	55	94	200	288	G1/2	G1/8
130	345	8 x 16	275	315	30	55	94	200	291	G1/2	G1/8

Other dimensions are available as an option. Please contact ANGA.

- Single mixer mechanical seal for dry running conditions
- Balanced
- Outside mounted
- Multi-spring
- Dual directional

Operating limits*		
Pressure	$p_{max}$	0,6 MPa
Temperature	$t_{max}$	180 °C
Speed	$v_{max}$	2,5 m/s

\* - see note on page 3.



## Legend

- |                    |               |
|--------------------|---------------|
| 1. Stationary ring | 9. Set screw  |
| 2. O-ring          | 10. Pin       |
| 3. Rotating ring   | 11. Cover     |
| 4. O-ring          | 12. Cover     |
| 5. Seal housing    | 13. O-ring    |
| 6. O-ring          | 14. Sleeve    |
| 7. Retaining ring  | 15. Set screw |
| 8. Spring          | 16. Screw     |

## Materials

Part	Code
Rotating ring	A, B
Stationary ring	Q
Secondary, flexible seals	E, P, V, K
Spring	M
Other metal parts	G, M

## Application

Type MS mechanical seal has a rotating ring made of special resin impregnated carbon graphite and special design which improve heat dissipation and other working conditions in case of dry running. Auxiliary installations are not necessary. It is designed for mixers, agitators and other equipment with rotating shafts used mainly in chemical, food processing, pharmaceutical and pulp & paper industries, for use with non-aggressive and non-hazardous media. A special dampening device is available to eliminate dry run screech. It can be made of materials that are approved for use in the pharmaceutical and food industries.

## Dimensions (mm)

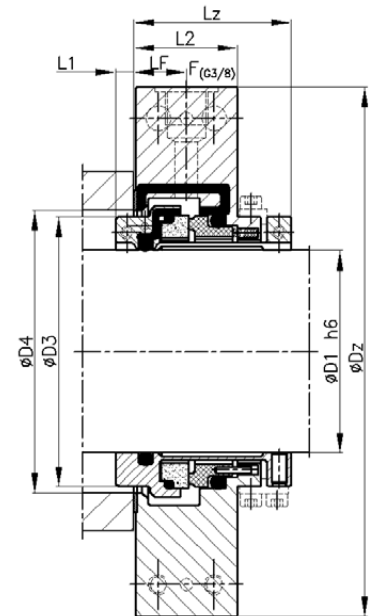
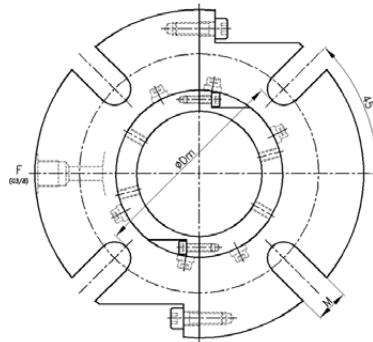
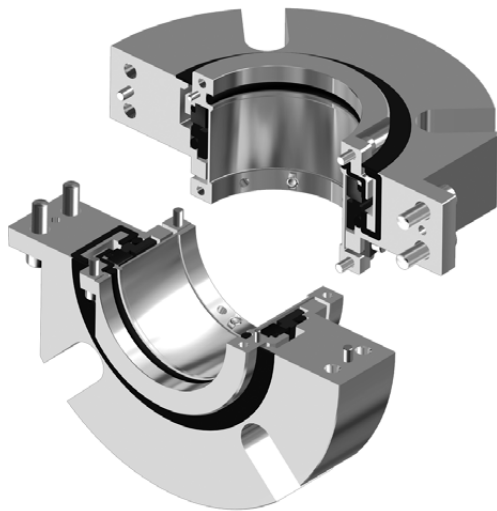
D1	D2	D3	Dr	Ds	Dz	Dm x n	Do	L1	L2	L3	L4	H	G
40	80	86	70	136	160	14 x 4	102	60,4	25,4	55,6	16-0.1	100	G 3/8
50	90	96	80	147	171	14 x 4	112	60,4	25,4	55,6	16-0.1	100	G 3/8
60	99	105	90	157	181	14 x 4	121	60,4	25,4	55,6	16-0.1	100	G 3/8
70	109	115	100	167	190	14 x 4	132	60,4	25,4	55,6	16-0.1	100	G 3/8
80	118	124	110	176	200	14 x 6	140	60,4	25,4	55,6	16-0.1	100	G 3/8
90	128	134	120	187	211	14 x 6	152	60,4	25,4	55,6	16-0.1	100	G 3/8
100	140	146	130	198	222	14 x 6	162	60,4	25,4	55,6	16-0.1	100	G 3/8
110	152,4	158,4	140	210	235	14 x 6	177	60,4	25,4	55,6	16-0.1	100	G 3/8

Other dimensions are available as an option. Please contact ANGA.

Operating limits*					
Diameter	D1	45 to 75	80 to 95	100 to 125	Above 125
Pressure	p <sub>max</sub>	1.7 MPa	1.4 MPa	1.0 MPa	0.7 MPa
Temperature	t <sub>max</sub>	175 °C			
Speed	n <sub>max</sub>	3600 1/min	1800 1/min	1800 1/min	875 1/min

\* - see note on page 3.

- Single compact (cartridge) mechanical seal
- Split design
- Hydraulically balanced
- Multi-spring
- Independent of the direction of rotation
- Springs are isolated from sealed liquids



## Dimensions (mm)

D1	D3	D4min	D4max	Dz	Dm	L1	L2	Lz	LF	M
45	65,1	66,68	78,2	140	84,9	6,35	54,0	64,0	16,7	14,3
48	68,2	68,85	79,38	140	90,5	6,35	54,0	64,0	16,7	14,3
50	68,2	68,85	79,38	140	90,5	6,35	54,0	64,0	16,7	14,3
55	77,8	79,40	88,90	159	100,0	6,35	54,0	64,0	16,7	17,4
60	81,0	85,73	95,25	165	104,8	6,35	54,0	64,0	16,7	17,4
65	85,0	88,90	98,40	165	112,8	6,35	54,0	64,0	16,7	17,4
68	90,5	92,08	104,78	169	112,8	6,35	54,0	64,0	16,7	17,4
70	90,5	92,08	104,78	197	112,8	6,35	54,0	64,0	16,7	17,4
75	96,8	100,00	111,10	203	125,4	6,35	54,0	64,0	16,7	17,4
80	106,4	108,00	120,65	210	131,8	7,14	62,0	72,0	20,6	20,6
90	115,9	117,50	130,20	219	141,3	7,14	62,0	72,0	20,6	20,6
95	117,5	119,05	130,18	222	144,5	7,14	62,0	72,0	20,6	20,6
100	125,4	127,00	136,52	224	147,6	7,14	62,0	72,0	20,6	20,6
110	135,0	136,50	149,20	235	163,5	7,14	62,0	72,0	20,6	20,6
115	140,5	142,90	155,60	248	173,0	7,14	62,0	72,0	20,6	20,6
120	143,7	146,05	158,75	248	176,2	7,14	62,0	72,0	20,6	20,6
125	157,2	160,30	171,40	273	185,7	9,50	77,8	96,8	23,4	23,8
140	169,9	173,00	184,10	292	198,4	9,50	78,0	97,0	23,4	23,8
145	176,2	179,40	193,70	305	207,2	9,50	77,8	96,8	23,4	23,8

Other dimensions are available as an option. Please contact ANGA.

## Application

MDZ is a single cartridge (compact) split seal designed to work with contaminated media with solid particles.

Split seals are designed for devices, in which disassemble and re-assemble of conventional seal takes many hours.

Fully split design of a cartridge seal MDZ solves the problem of seal replacement without dismantling a device. MDZ seal is perfect for use in devices with difficult access, such as pumps or mixers.

MDZ type can be widely used in the chemical, petrochemical, pharmaceutical, pulp and paper, food and energy sectors.

## Materials

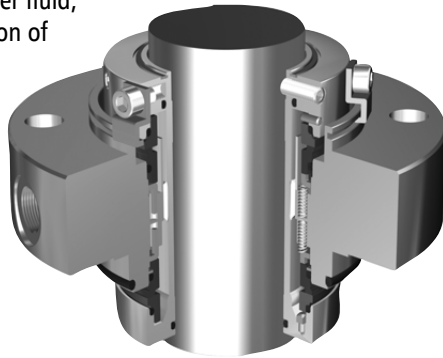
Part	Code
Rotating ring	Q
Stationary ring	Q, B
Secondary, flexible seals	V
Spring	M
Other metal parts	G



Pressure = Vacuum ÷ 1.6 MPa  
Temp. max = 200 °C  
Speed max = 20.0 m/s

## BED-J.646

Double mechanical seal, compact (cartridge) design, balanced, multi-spring, with internal forced circulation of barrier fluid, dependent on the direction of rotation, protected against reverse influence of pressure.

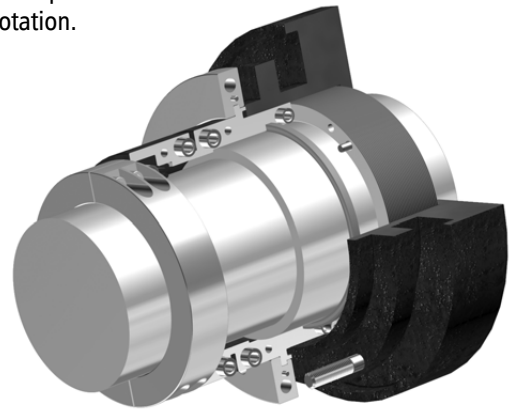


**BED-J.646** double mechanical seals are applied to seal **top entry vertical drives** in mixers and agitators. They can be made of materials that are approved for use in the pharmaceutical and food industries. Auxiliary installation according to EN ISO 21049 (API 682) is required: **Plan 52** (buffer fluid) or **Plan 53A** (barrier fluid).

Pressure max = 0,1 MPa  
Temp. max = 150 °C  
Speed max = 30 1/min

## IDZ-L.090

Single mechanical seal, balanced, multi-spring, independent of the direction of rotation.

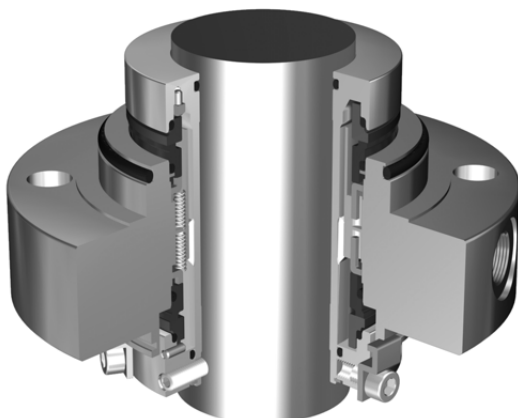


**IDZ-L.090** is a special mechanical seal designed for sealing shafts of very large **kneading reactors**, which knead very viscous adhesive masses. The design of kneaders, their large size and the specificity of processes require the use of the split seal, which will be working with a viscous medium and will be durable and easy to install.

Pressure = Vacuum ÷ 1.6 MPa  
Temp. max = 200 °C  
Speed max = 20.0 m/s

## BED-I.159

Double mechanical seal, compact (cartridge) design, balanced, multi-spring, with internal forced circulation of barrier fluid, dependent on the direction of rotation, protected against reverse influence of pressure.

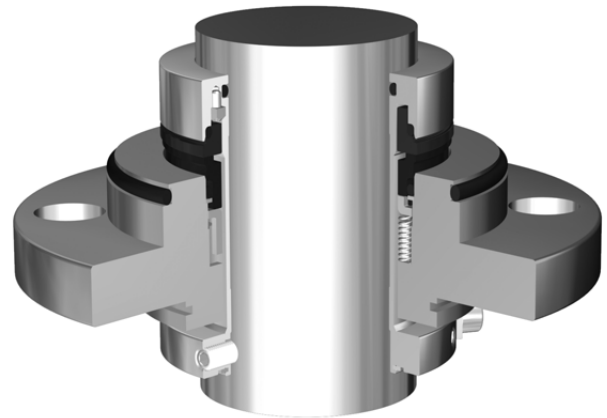


**BED-I.159** double mechanical seals are applied to seal **bottom entry vertical drives** in mixers and agitators. They can be made of materials that are approved for use in the pharmaceutical and food industries. Auxiliary installation according to EN ISO 21049 (API 682) is required: **Plan 52** (buffer fluid) or **Plan 53A** (barrier fluid).

Pressure = Vacuum ÷ 2.0 MPa  
Temp. max = 200 °C  
Speed max = 12.5 m/s

## BE1-I.159

Single mechanical seal, compact (cartridge) design, balanced, multi-spring, dependent on the direction of rotation.



**BE1-I.159** single mechanical seals are applied to seal **bottom entry vertical drives** in mixers and agitators. They can be made of materials that are approved for use in the pharmaceutical and food industries.

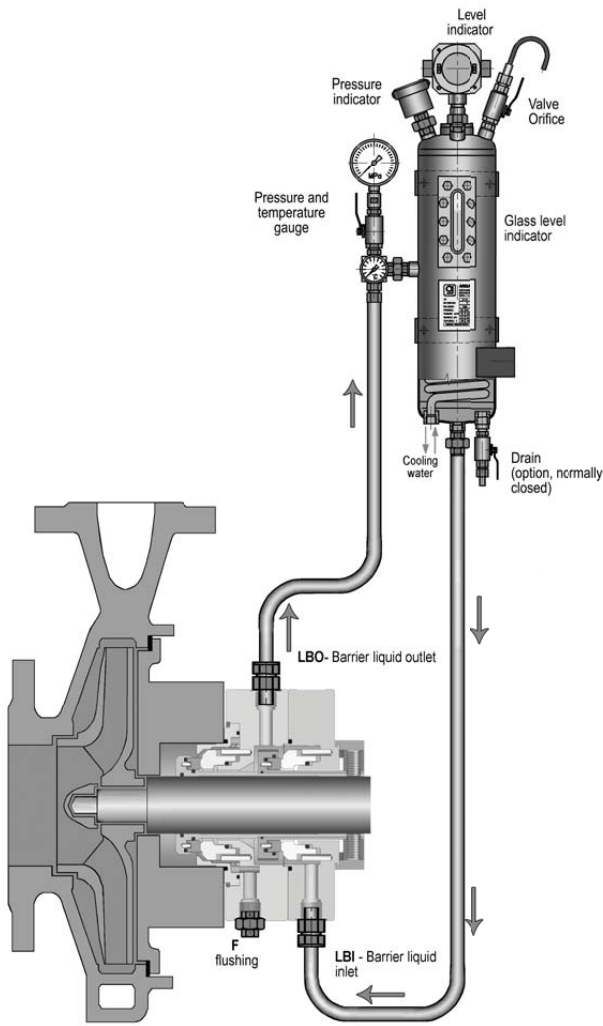
**Note!** Mechanical seal must be protected against „dry” running.

Apart from a wide range of mechanical seals offered by ANGA, we also provide our Customers with auxiliary installations, without which some applications of seals or effective and reliable operation of seals would not be possible. ANGA offers auxiliary installations designed according to EN ISO 21049 (API 682).

The most popular are auxiliary installations in accordance with API Plans 23, 52, 53A and 74, but on customer's request it is possible to provide installation according to other API Plans. Installations and their components are selected individually in accordance with the requirements of the Customer and the characteristics of the sealed process.

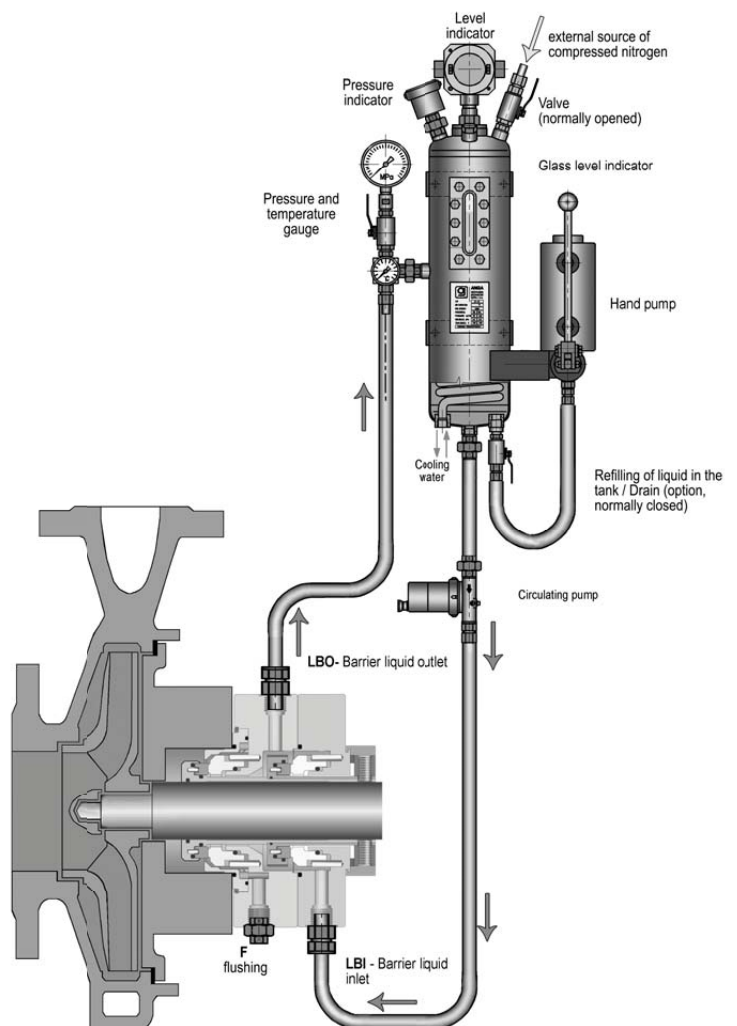
Below we present examples of the most common installations.

## API Plan 52



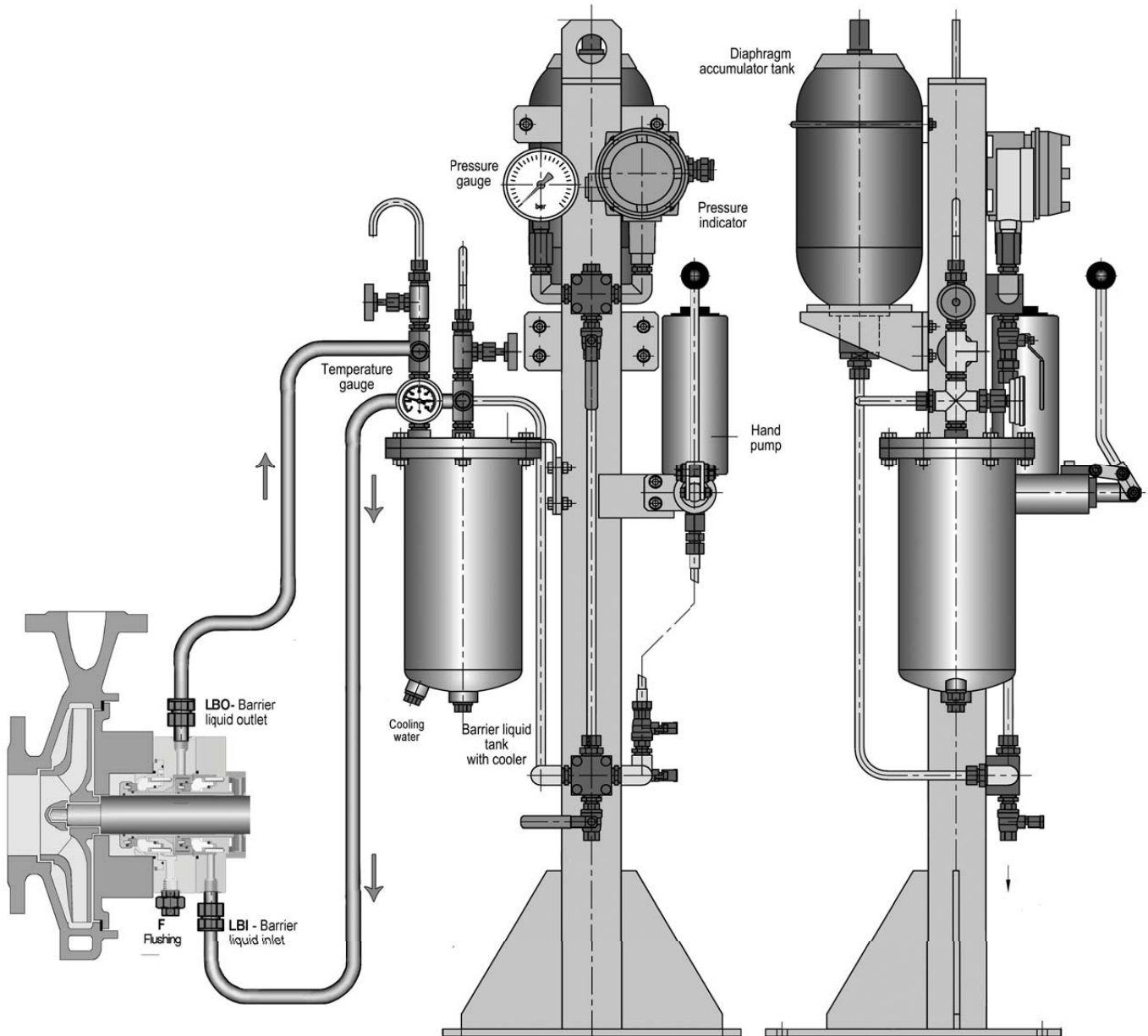
Plan 52 – the system is an unpressurized buffer liquid installation, comprising a buffer liquid tank, necessary connectors, valves, control and measuring equipment. The installation is connected to a double seal. During normal operation, the buffer liquid circulation is forced and maintained by the internal pumping ring of the seal. The tank is normally vented continuously to the gas recovery system and the pressure in it is lower than the pressure in the stuffing box.

## API Plan 53A



Plan 53A – the system is a pressure barrier liquid installation, comprising a barrier liquid tank, a manual pump for barrier liquid refilling, necessary connectors, valves, control and measuring equipment. The installation is connected to a double seal. During normal operation, the barrier liquid circulation is forced and maintained by the internal pumping ring of the seal. Pressure in the tank is higher than the pressure in the gland box and thus, the sealed medium is fully hermetic, and only a slight amount of the barrier liquid goes into the product and out into the atmosphere. Pressure in the tank is maintained by connecting an external pressure source, e.g., compressed nitrogen.

## API Plan 53B



Plan 53B - It is an external system of the barrier fluid, which is under a higher pressure than the pressure in the stuffing box (sealing chamber). The circulation of the barrier liquid is forced by an internal device of a seal.

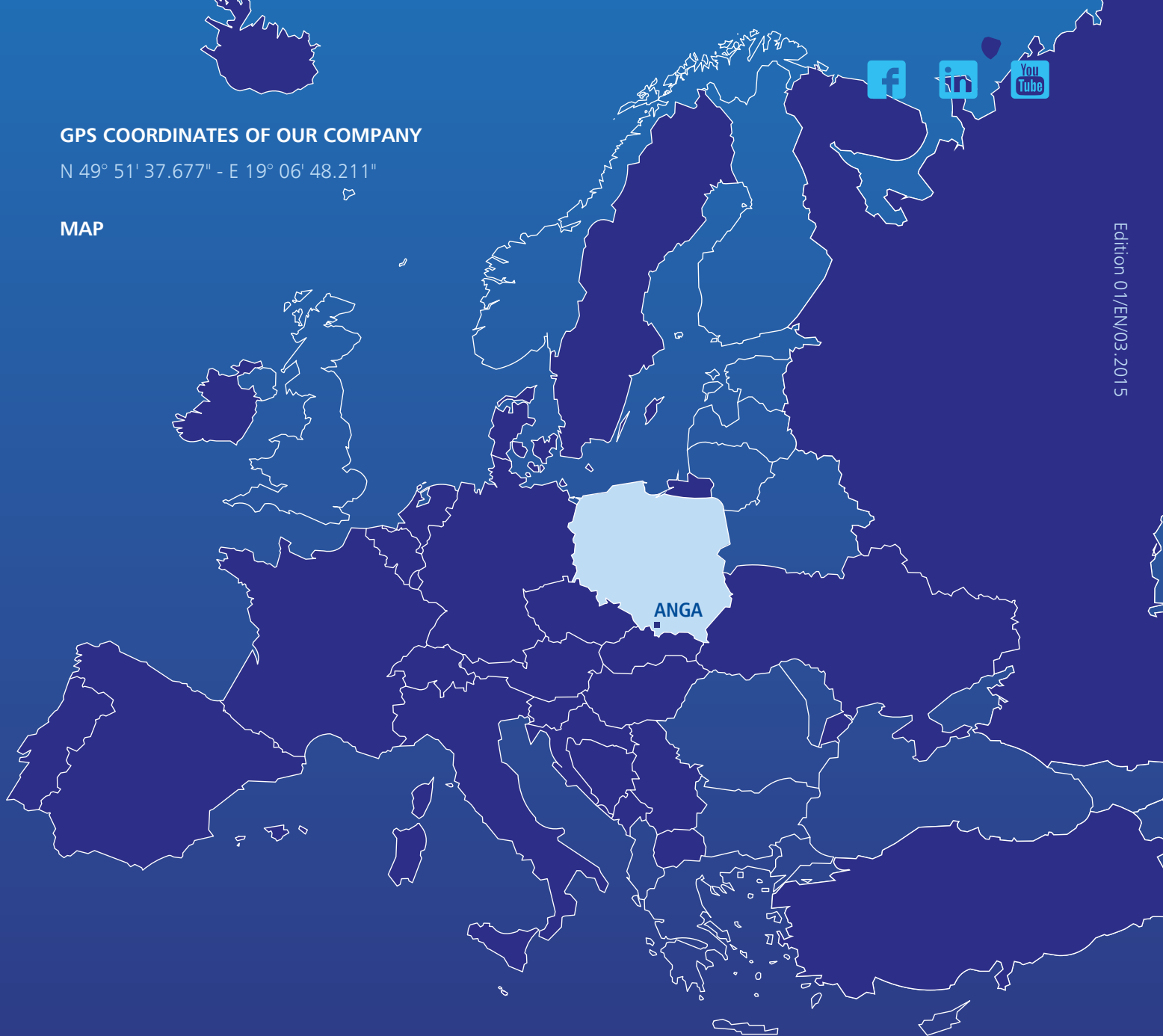
The pressure of the barrier fluid is kept by a diaphragm accumulator tank. The use of the accumulator tank prevents from gas absorption by the barrier liquid and enables the operation of the system at high pressure. The system is monitored by the decrease of pressure of the barrier liquid, caused by the leakage of the barrier liquid through internal and external seals. The pressure decrease is corrected by refilling of the barrier liquid.



### GPS COORDINATES OF OUR COMPANY

N 49° 51' 37.677" - E 19° 06' 48.211"

### MAP



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## ANGA

Uszczelnienia Mechaniczne Sp. z o.o.

A list of foreign representatives of ANGA is available on our website, in the Contact section, under the subpage Foreign representatives (you can use the QR code below).

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www.tektrade.ee



We are members of:



European Sealing Association e.V.



Our quality and environment management system complies with: