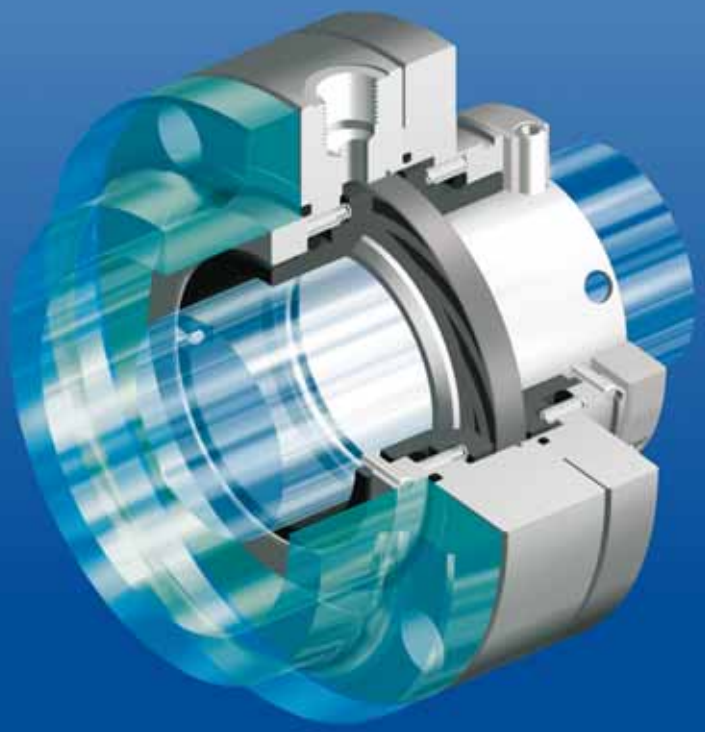

Mechanical Seals
Gleitringdichtungen
Торцовые Уплотнения

Certificates

ISO 9001
ISO 14001

POLSKIE CENTRUM AKREDYTACJI
POLISH CENTRE FOR ACCREDITATION

PCA

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 04.04.2014 r.
The certificate of accreditation is valid until 04.04.2014

Akredytację udzielono dnia 05.04.2006 r.
Accreditation was granted on 05.04.2006

POLSKIE CENTRUM AKREDYTACJI

DYREKTOR
POLSKIEGO CENTRUM AKREDYTACJI
EUGENIUSZ W. ROGUSKI

Warszawa, dnia 30 marca 2010 roku

BUREAU VERITAS
Certification

BUREAU VERITAS 1828

Certyfikat
Przyznany Firmie

„ANGA" Uszczelnienia Mechaniczne Sp. z o.o.
UL. WYZWOLENIA 550; 43-340 KOZY; POLAND

Bureau Veritas Certification North America, Inc. zaświadcza,
że System Zarządzania Jakością wyżej wymienionej organizacji został oceniony i uznany
jako zgodny z wymaganiami norm oraz zakresem usług wyszczególnionych poniżej

STANDARDY:

ISO 9001:2008 ORAZ AS9100-B
ZGODNIE Z AS9104A

Bureau Veritas Certification North America, Inc. posiada akredytację
Aerospace Registrar Management Program

ZAKRES CERTYFIKACJI:

OBRÓBKA MECHANICZNA I PRODUKCJA CZĘŚCI
DLA PRZEMYSŁU LOTNICZEGO

Data aktualnej certyfikacji: 23 MARCA 2011

Pod warunkiem stałego zadowalającego działania Systemu Zarządzania,
certyfikat jest ważny do: 22 MARCA 2014

Pozostałe informacje dotyczące zakresu certyfikacji oraz wymagań systemu zarządzania
można uzyskać w wyżej wymienionej organizacji.

Numer certyfikatu: 271689
Data wydania: 23 MARCA 2011

Data pierwszej certyfikacji: 11 GRUDNIA 2007
Poprzednia data ważności: 10 GRUDNIA 2010
Data ostatniego auditu recertyfikacyjnego: 15 LIPCA 2010

For Bureau Veritas Certification North America, Inc.
3663 North Sam Houston Pkwy, Houston, Texas, USA
www.us.bureauveritas.com/bvc

ANAB
ACCREDITED

CERTYFIKAT
ISO 14001:2004

DEKRA Certification

niniejszym potwierdza się, że przedsiębiorstwo

„ANGA"
Uszczelnienia Mechaniczne Sp. z o.o.

w zakresie:
Projektowanie, produkcja, badania, sprzedaż i serwis uszczelnień mechanicznych.

z siedzibą:
ul. Wyzwolenia 550 • PL – 43-340 Kozy

wdrożyło system zarządzania środowiskowego zgodnie z ww. normą i skutecznie
go realizuje. Zgodność systemu została sprawdzona podczas auditu recertyfikacyjnego,
wynik auditu udokumentowano w raporcie numer W-A 377011/B2/P/14001.
Niniejszy certyfikat jest ważny tylko w przypadku pozytywnego wyniku auditów nadzoru.

Certyfikat ważny od:	2011-05-27	Data pierwszej certyfikacji:	1999-08-01
Certyfikat ważny do:	2014-05-26	Nr rejestracyjny certyfikatu:	440011037 duplikat
Ostatni dzień auditu:	2011-05-10		

DEKRA Certification Sp. z o.o.
Wrocław, dnia 2011-05-27

IAF

UMS-TGA-ZM-05-91-60

CERTYFIKAT
ISO 9001:2008

DEKRA Certification

niniejszym potwierdza się, że przedsiębiorstwo

„ANGA"
Uszczelnienia Mechaniczne Sp. z o.o.

w zakresie:
Projektowanie, produkcja, badania, sprzedaż i serwis uszczelnień mechanicznych.

z siedzibą:
ul. Wyzwolenia 550 • PL – 43-340 Kozy

wdrożyło system zarządzania jakością zgodnie z ww. normą (11/2008) i skutecznie go realizuje.
Zgodność systemu została sprawdzona podczas auditu recertyfikacyjnego,
wynik auditu udokumentowano w raporcie numer W-A 377011/B2/P/9001.
Niniejszy certyfikat jest ważny tylko w przypadku pozytywnego wyniku auditów nadzoru.

Certyfikat ważny od:	2011-05-27	Data pierwszej certyfikacji:	1994-04-01
Certyfikat ważny do:	2014-05-26	Nr rejestracyjny certyfikatu:	320311015/1
Ostatni dzień auditu:	2011-05-10		

DEKRA Certification Sp. z o.o.
Wrocław, dnia 2011-05-27

IAF

QMS-TGA-ZM-05-91-00

Dear Sirs,

We would like to present to you the catalogue of ANGA, leading Polish producer of mechanical seals, in which we introduce our standard range of products and also more specialised products. We give the basic information needed for proper mechanical seal selection, depending on sealed medium, operating conditions, and the kind of equipment, in which this seal has to be assembled.

Having vast knowledge and experience in sealing technology and application, we have the ability to solve the most difficult demands of our Customers.

The high quality of our seals is supported with our warranty (particularly it concerns cartridge seals for power engineering) and with ISO 9001 certification. Delivering non-standard and specific versions as a customary option is possible. In some cases we offer the first assembly of a seal along with training of Customer's workers.

At our Customers disposal is our service department, which offers servicing and the seal's regeneration, different pump regeneration, and services in precision machining of the machine parts.

We hope, that this catalogue will be helpful for end users, designers, and maintenance staff of firms manufacturing and operating of pumps, mixers, agitators, reactors, high rotational speed gears, fans, and other machines with rotating shafts, which require an efficient and reliable seal.

In order to meet ecological requirements, our company, in cooperation with Kema The Netherlands, has implemented Environment Management System and since August 1999 ANGA is the holder of ISO 14001 Environmental Certificate.

We invite you to visit our web site:
www.anga.com.pl

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This material 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, should any doubts, ANGA Uszczelnienia Mechaniczne Sp. z o.o. (ANGA) makes possible to get information and advice, especially if operating conditions of the seal are dangerous for personnel and the environment.
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Types, Materials, Designation

ISO 9001
ISO 14001

SINGLE MECHANICAL SEAL - designation example

70 | US2 / A0 - A Q V M G

Shaft or sleeve diameter (mm)

Seal type ANGA

A4, A3L/R, V, VT, VS, VB, VBT, US, US2, E1 A1, A41, A1G, A10, A11, A12, A13, B12, W, VSK	acc. to EN 12756 (DIN 24960)
BE2, BC, BD, BEQ, BP, BU, EP, M1, M1L, MS, USC, UVP	

Stationary sealing ring type

1. A0, A5, E5, B0, E0, D0, F0, H0, H5	acc. to EN 12756 (DIN 24960)
2. Number of special desinging for specific dimension: 01, 02, 03,...	

Rotating sealing ring material

Stationary sealing ring material

A	–	Antimony impregnated carbon graphite	
B	–	Resin impregnated carbon graphite	
Q	–	Sintered silicon carbide	(SiC)
Q1	–	Reaction bonded silicon carbide	(SiC-Si)
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	(Al2O3 ; 99.5%)
V1	–	Al-Oxide ceramic	(Al2O3 ; 96.0%)
Y	–	Glass filled PTFE	

Secondary, flexible seal material

E	–	Ethylene-propylene elastomer	(EPDM)
K	–	Perfluorcarbon elastomer	(FFKM)
N	–	Chloroprene elastomer	(CR)
P	–	Nitrile elastomer	(NBR)
S	–	Silicone elastomer	(MVQ)
V	–	Fluorcarbon elastomer	(FKM)
M	–	Fluorcarbon + PTFE – encapsulated	(FKM/PTFE)
G	–	Graphite	
T	–	PTFE Teflon ®	(PTFE)

Spring material

G	–	CrNiMo acid-proof steel	(1.4310)
M	–	Hastelloy® C-4	(2.4610)

Metal part material

F	–	CrNi acid-proof steel	(1.4541)
G	–	CrNiMo acid-proof steel	(1.4571)
M	–	Hastelloy® C-4	(2.4610)
M1	–	Monel	(2.4360)
T2	–	Tytan	(3.7035)

DOUBLE MECHANICAL SEAL - designation example

Medium side | Atmosphere side

43 VD / A0 A0 - Q Q K G G B Q V

Shaft or sleeve diameter (mm)

Seal type ANGA

VD, GF, GK4, GKF BED, BPD, BUV, EPD, BEH, M3/M3L, USP	acc. to EN 12756 (DIN 24960)

Stationary sealing ring type of inner seal

Stationary sealing ring type of outer seal

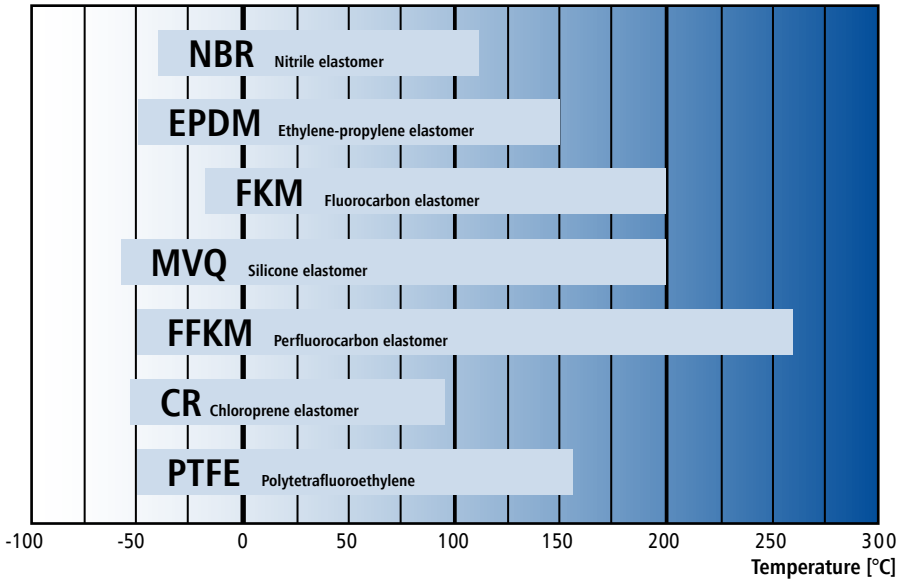
Materials of inner seal components *

Materials of outer seal components *

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

The brand name Hastelloy is distinguished by ® sign, and its ownership rights belongs to Haynes International Inc.

Thermal resistance of elastomers



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

Recommended and permissible application of stationary rings

Ring type	Seal type										
	A1	A3	A4 A41	A10 A11	US US2	E1	W	V VT VS	VD	VB VBT	A12 A13 B12
A0	●	●	●		●	●		●	●	●	
A5	●	●	●								
B0											
D0*											●
E0	●										
E5	●	●	●								
F0											
H0											
H5				●			●				

● – recommended stationary ring

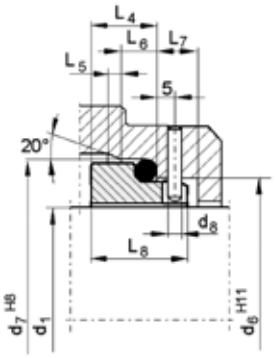
– permissible stationary ring

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

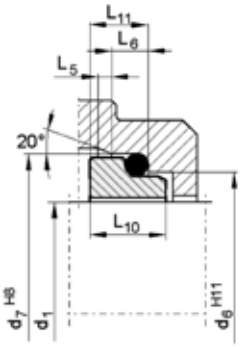
Stationary rings

ISO 9001
ISO 14001

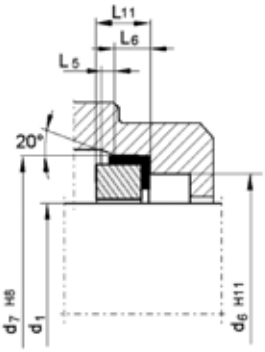
A0 EN 12756 (DIN 24960)



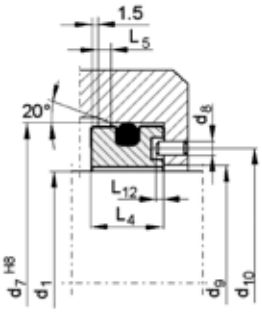
A5 EN 12756 (DIN 24960)



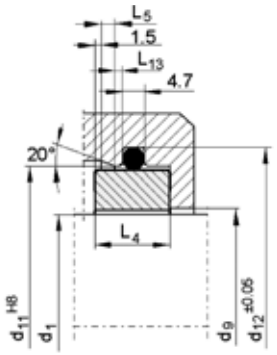
E5 EN 12756 (DIN 24960)



B0 EN 12756 (DIN 24960)



D0



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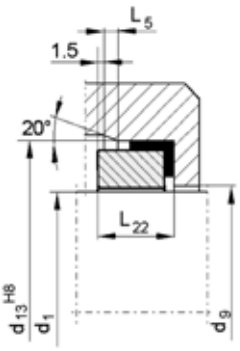
10	22	17	21	3.0	11.0	16.0	21.2	26.8	10.0	1.5	4.0	8.5	16.0	9.0	6.5	1.5	2.0
12	24	19	23	3.0	13.0	18.0	24.2	29.8	10.0	1.5	4.0	8.5	16.0	9.0	6.5	1.5	2.0
14	26	21	25	3.0	15.0	20.0	26.2	31.8	10.0	1.5	4.0	8.5	16.0	9.0	6.5	1.5	2.0
16	28	23	27	3.0	17.0	22.0	27.2	32.8	10.0	1.5	4.0	8.5	16.0	9.0	6.5	1.5	2.0
18	34	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

E0



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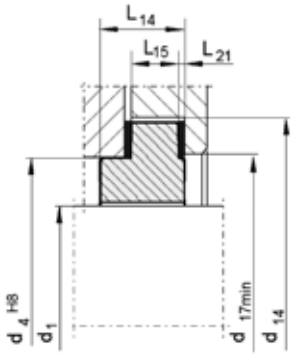

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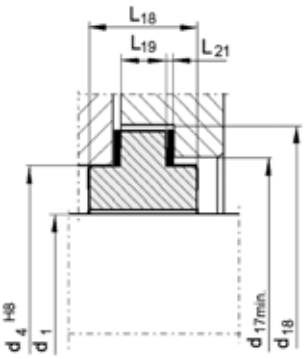
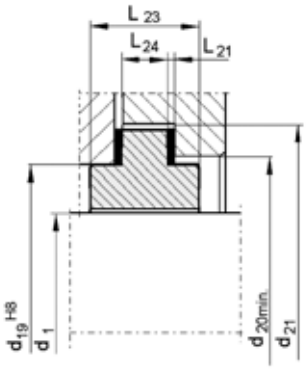


H5



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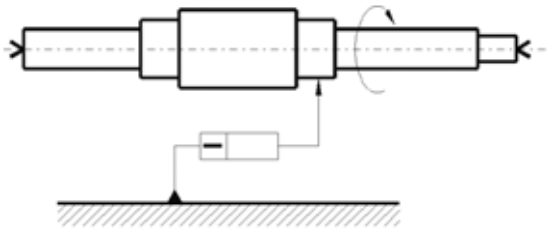
12	24	13.0	26	40.0	25.0	40	-	-	-	1.5	17	9.5	18	1.0	8.5	-	-
14	26	15.0	28	42.0	27.0	42	-	-	-	1.5	17	9.5	18	1.0	8.5	-	-
16	28	17.0	32	44.0	29.0	44	36.6	37.5	48	1.5	17	9.5	18	1.0	8.5	17.6	8.0
18	34	19.0	35	47.0	35.0	47	36.6	37.5	48	2.0	17	9.5	18	1.0	9.5	17.6	8.0
20	36	21.0	38	49.0	37.5	49	39.7	40.5	51	2.0	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

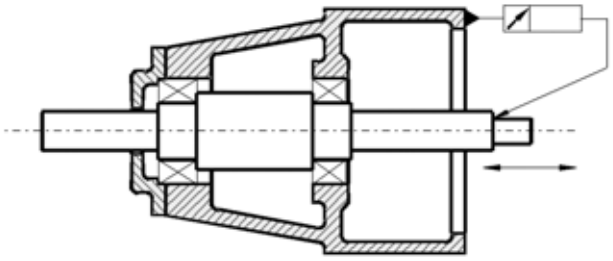
Allowed tolerances of the pump's shaft

The specifications and values given below are maximum ones. Should these be exceeded the malfunctioning or even destruction of the seals will be inevitable and in such cases ANGA Ltd cannot bear responsibility.

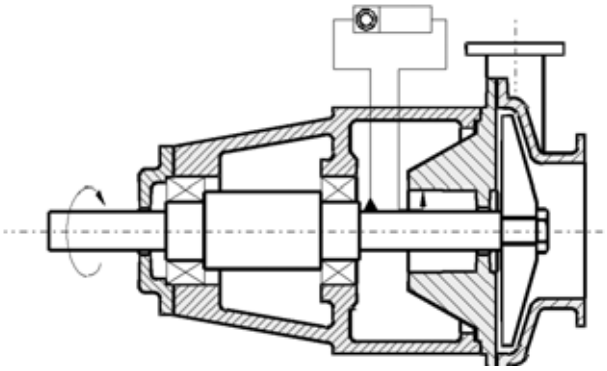
1. Shaft rectilinearity must not exceed:
   for d - 50 mm: max 0.03 mm
   for d > 50 mm: max 0.05 mm



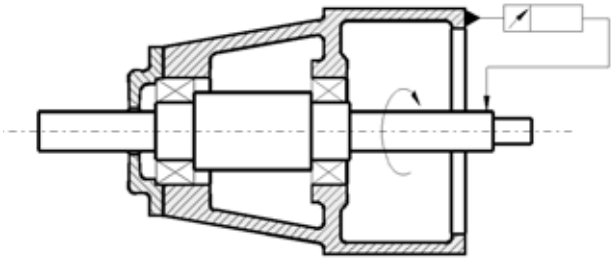
2. Axial shaft bearing clearance must not exceed
   max 0.05 mm



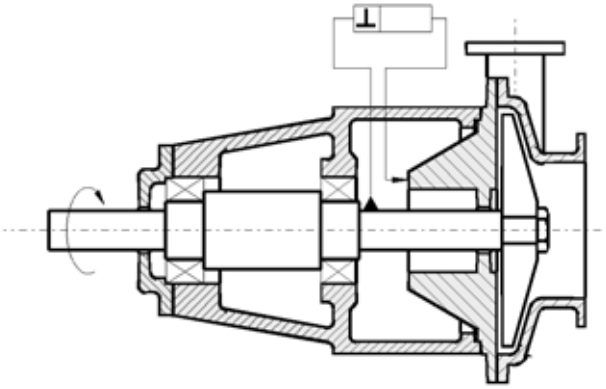
3. Concentricity tolerance of the seal chamber in relation to the shaft must not exceed 0.15 mm max
   In case of using a mechanical seal with pumping screw the allowed tolerance must not exceed 0.1 mm max



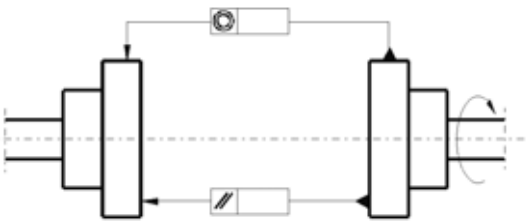
4. Shaft runout in place where the mechanical seal is to be installed must not exceed:
   for d - 50 mm: max 0.05 mm
   for d > 50 mm: max 0.08 mm



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



6. Coupling alignment must not exceed:
   max 0.08 mm



Mechanical seal application data form

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

Thank You !
ANGA Mechanical Seals Ltd

1. USER DATA

Name of company:				
Street:	*No.:*	*Postcode:*	*City:*	*Country:*
Phone:	*Fax:*	*E-mail:*		
Name of the respondent:	*Position:*	*Phone:*		

2. EQUIPMENT'S DATA

Type (designation):	*Manufacturer:*		
Type of equipment: ☐ pump ☐ mixer ☐ other	*Shaft's location:* ☐ horizontal ☐ vertical ☐ diagonal	*Direction of rotation:* ☐ right ☐ left ☐ changeable	*Location:* ☐ indoor ☐ outdoor ☐ portable
Speed [rpm]:	*Maximum pressure / underpressure [MPa]*	*Flowrate [m³/h]:*	
Currently used seal: ☐ mechanical ☐ packings ☐ new design	*If there is mechanical seal, please give:* designation: ..... producer:		
Other (additional requirements, required tests and certificates etc.):		*Quantity:*	

3. SEALED FLUID DATA

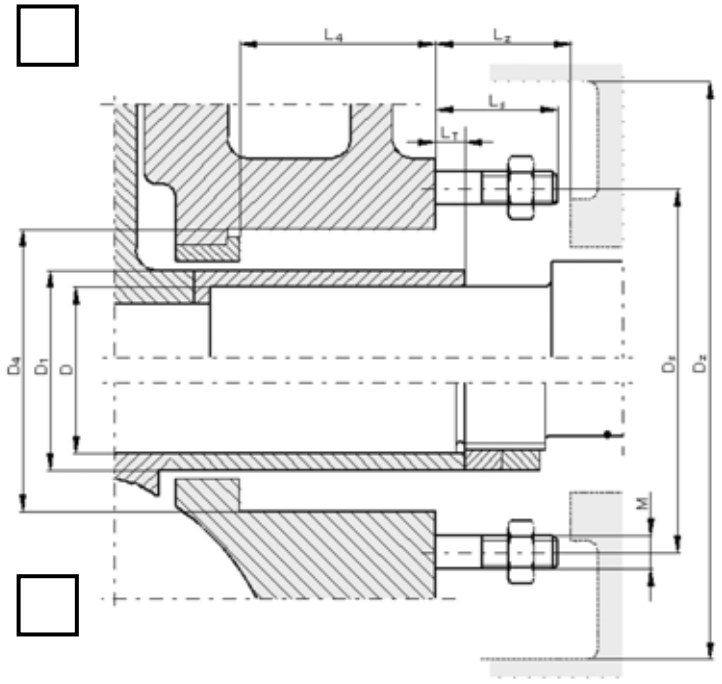
Name of sealed fluid:		*Chemical formula:*	
Type of fluid: ☐ homogeneous ☐ solution with concentration %: ..... ☐ mixture	*If it is a mixture. please indicate components and its share %:* 1. 5. 2. 6. 3. 7. 4. 8.		*Dry running ?* ☐ yes ☐ no
Density [g/cm³]	*Sealed pressure [MPa]:*	*pH factor:*	*Viscosity:*
Operation temperature [°C]:	*Boiling/melting temp. [°C]:*	*Ignition temp. [°C]:*	*Flash point [°C]:*
Abrasives: ☐ yes, % share: ..... ☐ no	*Characteristic changeable during process:* ☐ yes (describe it below) ☐ no	*Is support installation necessary:* ☐ heating ☐ cooling	*Mode of operation:* ☐ continuous ☐ periodical (describe it below)
Name of acceptable buffer (flushing) fluid:		*Enviromental risks/hazards (permissible leakage in ppm):*	
Remarks (additional requirements, health and enviromental risks, changes of sealed fluid characteristic during process or machine stop etc.):			

Seal installation dimensions

Select and mark **X** in ☐ your proper type of installation and indicate required dimensions.

4A.	Stuffing box with compression packings	
D	Shaft O.D.	
D_1	Sleeve O.D.	
D_4	Stuffing box bore	
D_S	Gland bolts circle (PCD)	
D_Z	Free zone I.D.	
L_4	Box chamber depth	
L_S	Length of bolts	
L_T	End of sleeve	
L_Z	Lenght to nearest obstruction	
M	Size of bolts	
n	Quantity of bolts	

☐



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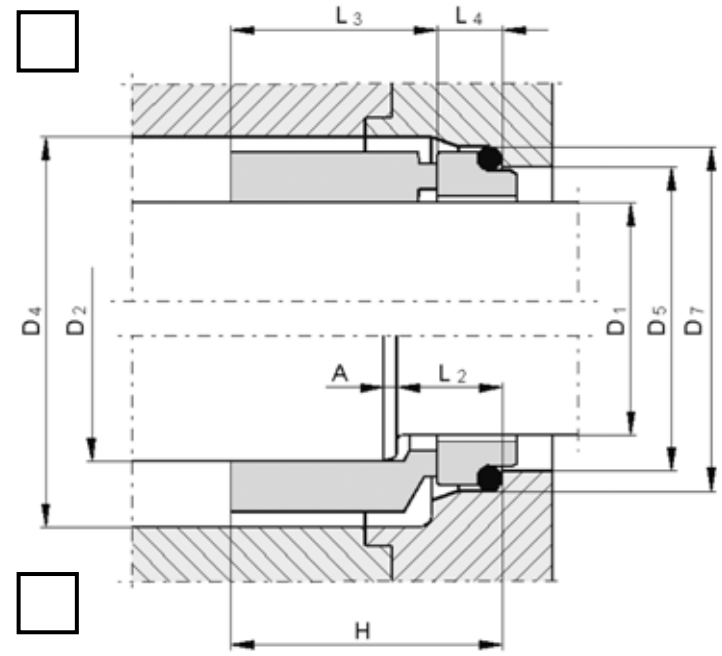
4A.	Stuffing box with mechanical seal	
D_1	Shaft/sleeve O.D.	
D_2	Shaft stage O.D.	
D_4	Stuffing box I.D.	
D_5	Gland plate hole I.D.	
D_7	Seat I.D.	
L_2	Distance between shaft step and seat base	
L_3	Seal rotating unit length	
L_4	Stationary unit length	
H	Total length of seal after assembling	
A	Chamfer	

☐



ISO 9001
ISO 14001

•ANGA• USZCZELNIENIA MECHANICZNE Sp. z o.o.

producer of mechanical seals

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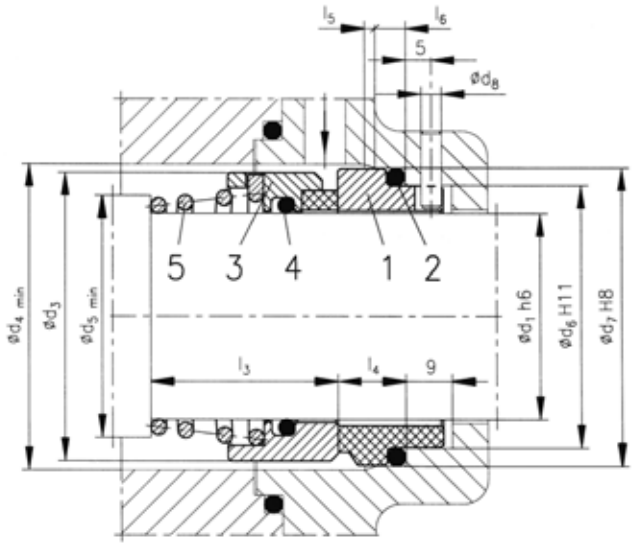
tel. (+48 33) 827-80-00, fax (+48 33) 827-80-11

e-mail: anga@anga.com.pl www.anga.com.pl

- Single mechanical seal
- Unbalanced
- Dependent on 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 diagram „Thermal resistance of elastomers".



Legend

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

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 ÷ 30 mm ± 0.5 mm
d_1 = 32 ÷ 50 mm ± 0.8 mm
d_1 = 53 ÷ 100 mm ± 1.0 mm

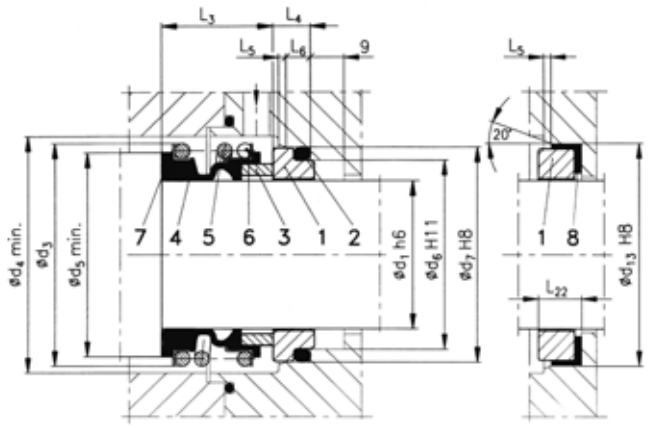
Other dimensions are available in option. Please contact ANGA.

A1

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

* - see diagram „Thermal resistance of elastomers".

- Single mechanical seal
- With rubber bellows
- Unbalanced
- Independent on 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
90	127,0	131	114,0	105	115	-	45,0	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	240	124,0	115	125	-	47,0	14,0	3,0	7	16,0

* tolerance of L_3 dimension for $d_1 = 10 \div 30$ mm ± 0.5 mm
$d_1 = 32 \div 50$ mm ± 0.8 mm
$d_1 = 53 \div 100$ mm ± 1.0 mm

Other dimensions are available in option. Please contact ANGA.

Legend

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

Note

There is also **A1G** version with extended bellows available.

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.

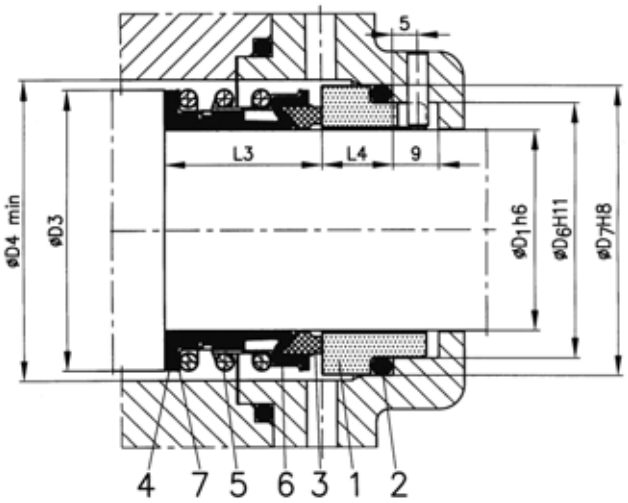
Materials

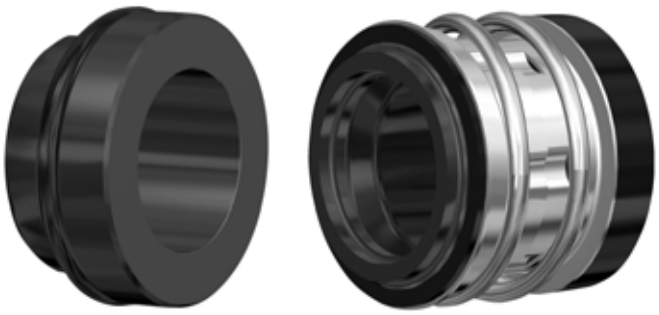
Part	Code
Rotating ring	A, B, U, Q
Stationary ring	U2, Q, V, S
Secondary, flexible seals	E, P, S, V
Spring	G
Other metal parts	F, G

- Single, balanced mechanical seal with elastomer bellows
- Central, non-clogging coil spring
- Dual-direction of shaft rotation
- Bellows protected against twisting
- Easy and quick installation

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

* - maximum pressure depends on shaft diameter.
** - see diagram „Thermal resistance of elastomers".





Legend

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

Application

Universal, general purpose mechanical seal for water/water based solutions, oils, fuels and other fluids even with some content of abrasives and for a very wide operating conditions. Design destined 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 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

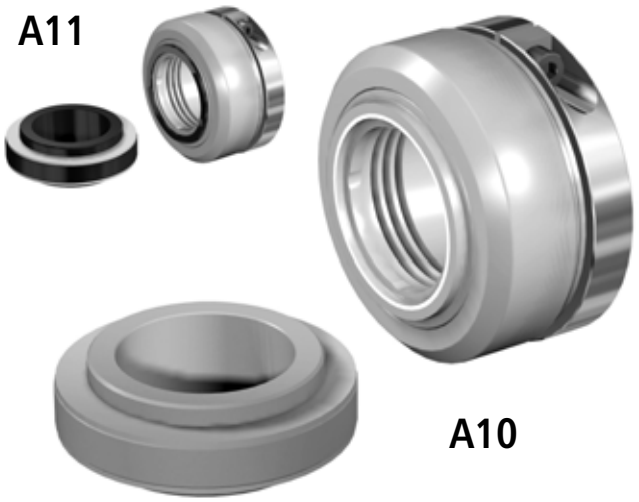
* tolerance of L_3 dimension for $d_1 = 10 \div 30$ mm ± 0.5 mm
$d_1 = 32 \div 80$ mm ± 1.0 mm
Other dimensions are available in option. Please contact ANGA.

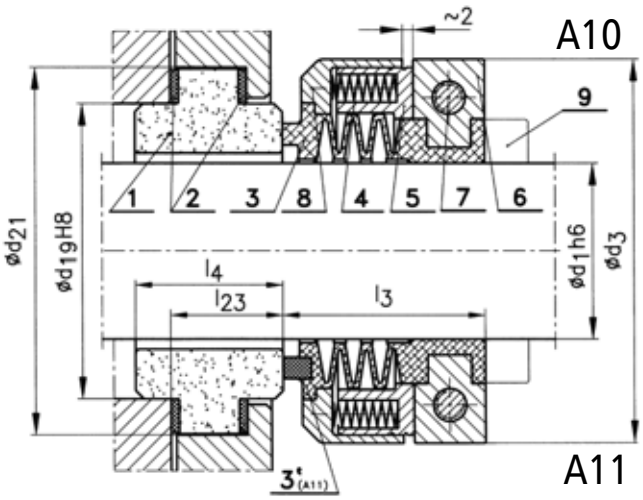
A10, A11

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

* - see diagram „Thermal resistance of elastomers".

- 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 duties (A10 only for non-abrasive applications). All metal components, including springs are isolated from the sealed, aggresive medium.

Legend

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

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

** - available is version A11 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 in option. Please contact ANGA.

Note:

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

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

Materials

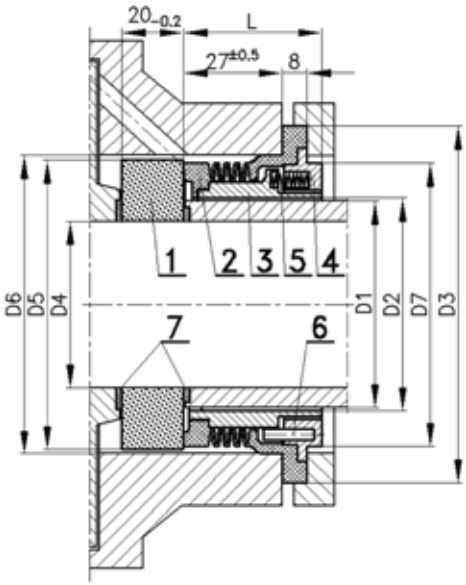
Part	Code A10	Code A11
Rotating ring	Y	B, A
Stationary ring	Q, V	
Secondary, flexible seals	T1	
Spring	M	
Other metal parts	G	

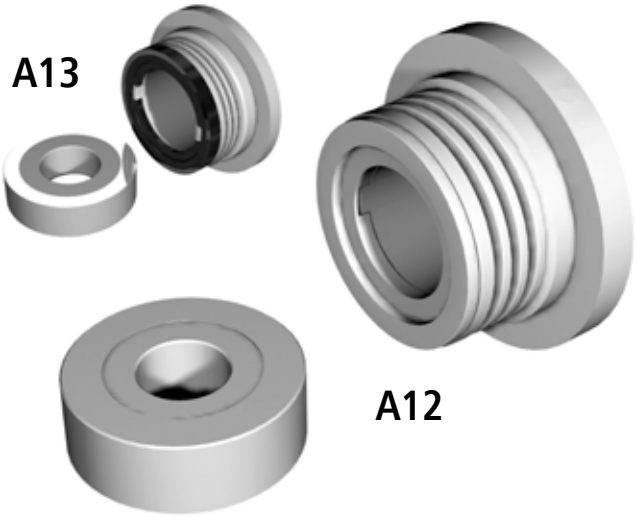
A12, A13, B12

- Single mechanical seal
- Balanced
- Independent of sense of 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 diagram „Thermal resistance of elastomers".





Legend A12, A13

1. Rotating ring
2. A12/A13 bellows
3. Sleeve
4. Cage
5. Spring
6. Driver
7. Flat gasket

Legend B12

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

Dimensions (mm)

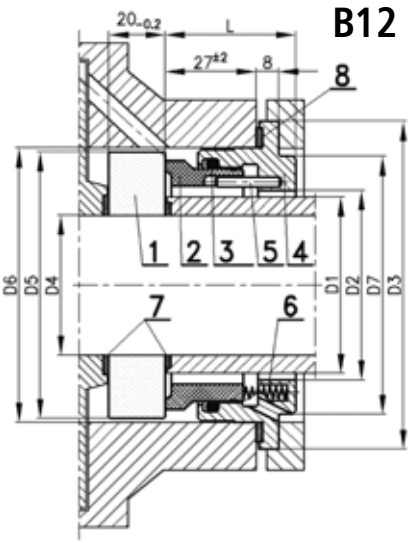
D1	D2	D3	D4	D5	D6	D7	L
30	32	78	22	56	60,1	54	38
35	37	83	22	56	65,1	60	38
40	42	88	32	66	70,1	65	41
45	47	94	32	70	75,1	70	41
50	52	100	40	76	80,1	75	41
60	62	110	37	86	90,1	85	41
70	**72**	**120**	**60**	**97**	**100,1**	**95**	**41**
80	82	130	70	107	110,1	105	41

Other dimensions are available in option. Please contact ANGA.

Application

The A12 is a mechanical seal intended for operating with extreme aggressive chemical compounds, which does not contain abrasive parts. For the **A13** seal, presence of small abrasive particles is permitted.
Metal elements of the A12, A13 seal do not contact the sealed medium.

The **B12** mechanical seal is intended for operating with aggressive chemical compounds containing abrasive particles. Using the B12 seals for media of temperature above 80°C is recommended.



Materials

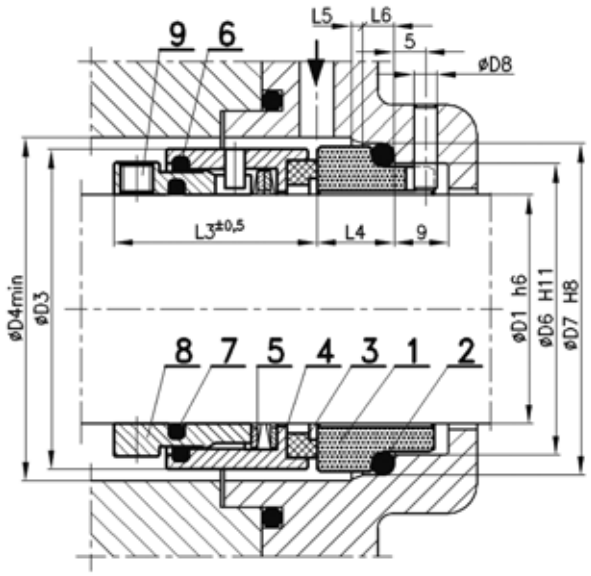
Part	Code A12	Code A13	Code B12
Rotating ring	V, Q		
Stationary ring	Y	B	B, Q
Secondary, flexible seals	T1		T1, V, K, E
Spring	M		
Other metal parts	-		G, T2

US EN 12756

Operating limits		
Pressure	p_{max}	2.0 MPa
Temperature	t_{max}	200 °C *
Speed	v_{max}	20 m/s

* - see diagram „Thermal resistance of elastomers".

- Single mechanical seal
- Balanced
- Sinus-spring
- Dual directional
- Spring isolated from medium



Dimensions (mm)

D1	D3	D4	D6	D7	D8	L3*	L4	L5	L6
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

* tolerance of L_3 dimension is ± 0.5 mm
Other dimensions are available in option. Please contact ANGA.

Legend

1. Stationary ring typu A0
2. O-ring
3. Rotating ring
4. Rotating ring housing
5. Sinus-spring
6. O-ring
7. O-ring
8. Seal housing
9. Set screw

Application

Mechanical seal type **US** is designed for work with hot and cold water, oils, fuels, low aggresive chemical substances and liquids containing solid particles. Used mainly in centrifugal pumps in purification plants, pulp & paper, chemical, petrochemical and sugar industries.

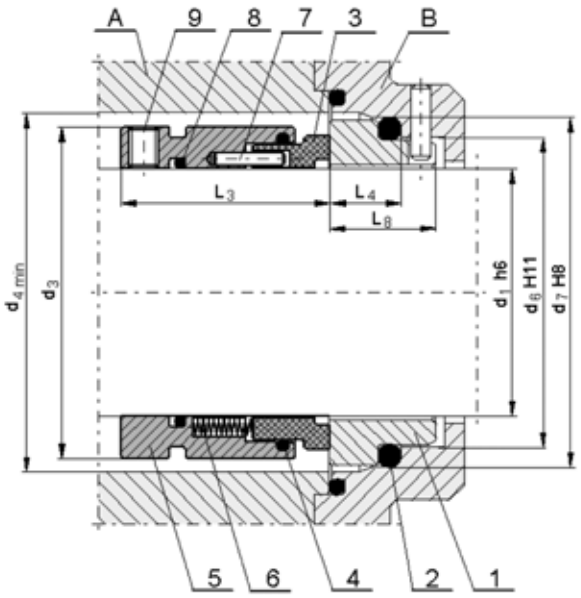
Materials

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

- Single mechanical seal
- Balanced
- Dual directional
- Multi-spring

Operating limits		
Pressure	p_{max}	2.0 MPa
Temperature	t_{max}	200 °C *
Speed	v_{max}	20 m/s

* - see diagram „Thermal resistance of elastomers".



Legend

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

A - Pump stuffing box

B - Stationary ring cover

Application

Type **US2** mechanical seal is designed for application in centrifugal pumps handling water, oils, low aggresive chemicals, muds and fluids containing solids and used mostly in petrochemical, chemical, pulp & paper, sugar industries and in wastewater treatment plants.

Materials

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

Dimensions (mm)

D1	D3	D4	D6	D7	L3*	L4	L8
24	38	40	33	39	38,5	11,5	18,0
25	39	41	34	40	38,5	11,5	18,0
28	42	44	37	43	38,5	11,5	18,0
30	44	46	39	45	38,5	11,5	18,0
32	46	48	42	48	38,5	11,5	18,0
33	47	49	42	48	38,5	11,5	18,0
35	49	51	44	50	38,5	11,5	18,0
38	54	58	49	56	41,0	14,0	20,5
40	56	60	51	58	41,0	14,0	20,5
43	59	63	54	61	42,5	14,0	20,5
45	61	65	56	63	42,5	14,0	20,5
48	64	68	59	66	42,5	14,0	20,5
50	66	70	62	70	45,0	15,0	21,5
53	69	73	65	73	45,0	15,0	21,5
55	71	75	67	75	45,0	15,0	21,5
58	78	83	70	78	50,0	15,0	21,5
60	80	85	72	80	50,0	15,0	21,5
63	83	88	75	83	50,0	15,0	21,5
65	85	90	77	85	50,0	15,0	21,5
68	88	93	81	90	50,0	15,0	21,5
70	90	95	83	92	57,0	17,0	23,0
75	99	104	88	97	57,0	17,0	23,0
80	104	109	95	105	62,0	17,0	23,2
85	109	114	100	110	62,0	17,0	23,2
90	114	119	105	115	62,0	17,0	23,2
95	**119**	**124**	**110**	**120**	**62,0**	**17,0**	**23,2**
100	124	129	115	125	62,0	17,0	23,2

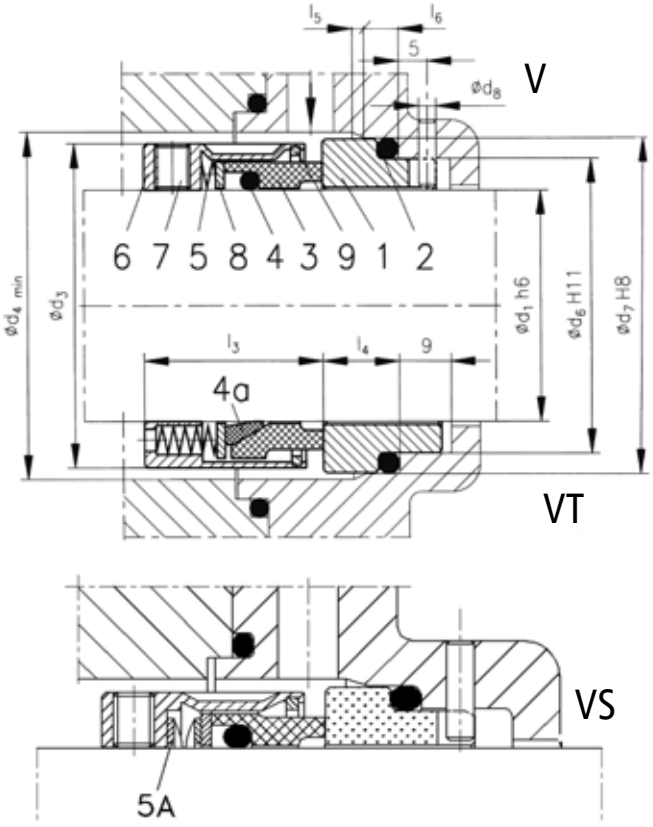
* tolerance of L_3 dimension is ± 0.5 mm
Other dimensions are available in option. Please contact ANGA.

V, VT, VS EN 12756

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

* - see diagram „Thermal resistance of elastomers".

- Single mechanical seal
- Unbalanced
- Dual directional
- Multi-spring (version **V**, **VT**)
- Sinus-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_3 dimension is ± 0.5 mm
Other dimensions are available in option. Please contact ANGA.

Legend

1. Stationary ring
2. O-ring
3. Rotating ring
4. O-ring
4a. PTFE wedge gasket (version **VT**)
5. Spring
5a. Sinus-spring (version **VS**)
6. Seal housing
7. Set screw
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, low aggressive chemicals, and refrigerants in centrifugal pumps and other equipment with rotating shafts.

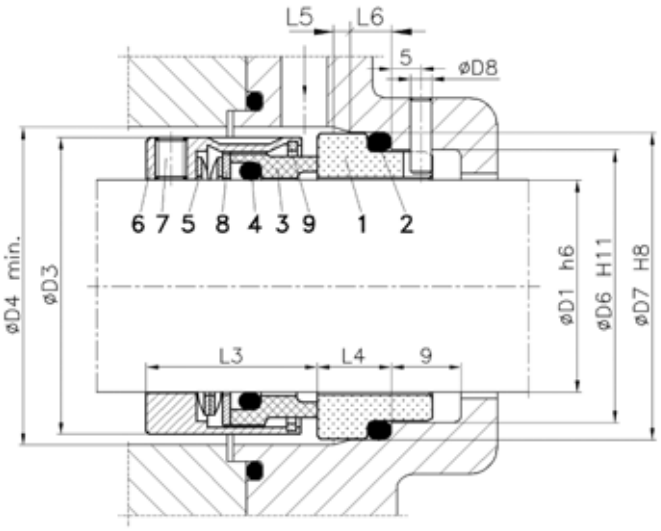
Materials

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
- With wave spring

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

* - see diagram „Thermal resistance of elastomers".



Legend

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

Application

General purpose **VSK** seal designed for use with petroleum products, low 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

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

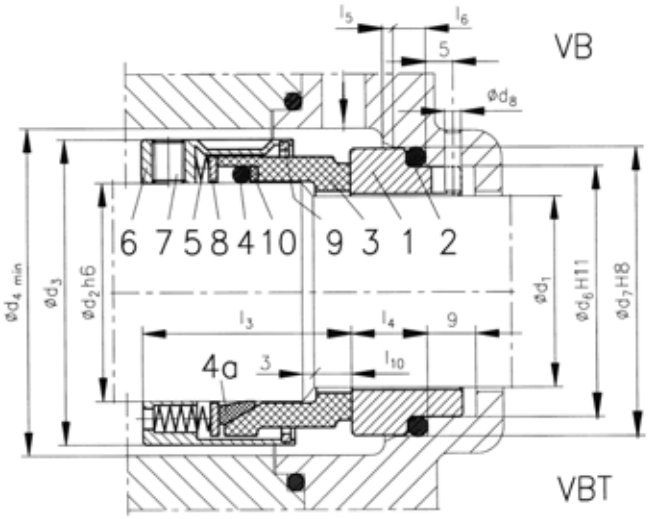
* tolerance of L_2 dimension is ± 0.5 mm
Other dimensions are available in option. Please contact ANGA.

VB, VBT EN 12756

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

* - Pressure maksymalne zależy od średnicy wału: 2.5 MPa - dia 100 mm, 5.0 MPa - dia 18 mm.
** - see diagram „Thermal resistance of elastomers".

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



Dimensions (mm)

* -Diameter d_2 is a nominal dimension.

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 ± 0.5 mm
Other dimensions are available in option. Please contact ANGA.

Legend

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

Application

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

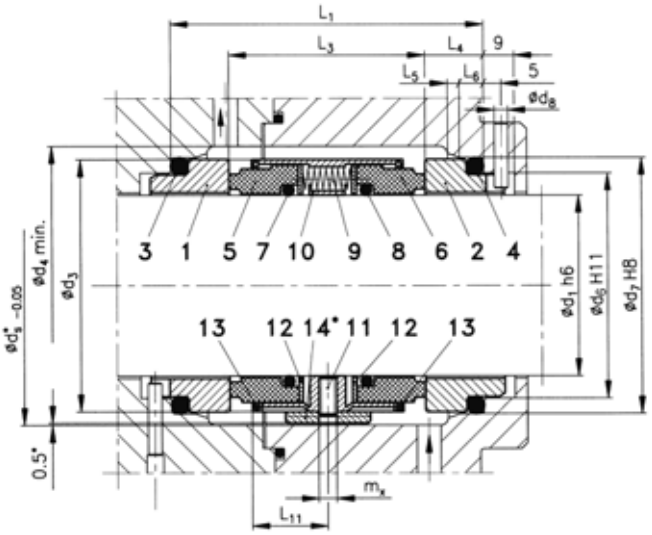
Materials

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

- Double mechanical seal:
- Unbalanced
- Multi-spring
- Independent on direction of shaft rotation unless pumping screw is applied.

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

* - see diagram „Thermal resistance of elastomers".



Legend

1. Stationary ring
2. Stationary ring
3. O-ring
4. O-ring
5. Rotating ring
6. Rotating ring
7. O-ring
8. O-ring
9. Spring
10. Seal housing
11. Set screw
12. Thrust plate
13. Snap spring ring
14. Pumping screw (option)*

* - Version with pumping screw (flushing system). Dependent on direction of shaft rotation.

Application

Double mechanical seals are recommended for liquids which do not form lubricating films and for toxic, flammable and explosive media handled by centrifugal pumps and other equipment with rotating shaft.
Use of barrier or buffer fluid system assures reliable run of the seal providing lubrication, cooling and removal of deposits from sliding faces area.

Materials

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

Dimensions (mm)

d1	d3	d4	d6	d7	d8	ds*	L1	L3**	L4	L5	L6	L11	Mx
18	32	34	27	33	3	38	63,	40,0	11,5	2,0	5	16,5	M6
20	34	36	29	35	3	40	63,0	40,0	11,5	2,0	5	16,5	M6
22	36	38	31	37	3	42	63,0	40,0	11,5	2,0	5	16,5	M6
24	38	40	33	39	3	44	67,0	44,0	11,5	2,0	5	17,5	M6
25	39	41	34	40	3	45	67,0	44,0	11,5	2,0	5	17,5	M6
28	42	44	37	43	3	48	69,0	46,0	11,5	2,0	5	18,0	M6
30	44	46	39	45	3	50	69,0	46,0	11,5	2,0	5	18,0	M6
32	46	48	42	48	3	52	69,0	46,0	11,5	2,0	5	18,0	M6
33	47	49	42	48	3	53	69,0	46,0	11,5	2,0	5	18,0	M6
35	49	51	44	50	3	55	69,0	46,0	11,5	2,0	5	18,0	M6
38	54	58	49	56	4	61	78,0	50,0	14,0	2,0	6	20,5	M6
40	56	60	51	58	4	63	78,0	50,0	14,0	2,0	6	20,5	M6
43	59	63	54	61	4	66	78,0	50,0	14,0	2,0	6	20,5	M6
45	61	65	56	63	4	68	78,0	50,0	14,0	2,0	6	20,5	M6
48	64	68	59	66	4	71	78,0	50,0	14,0	2,0	6	20,5	M6
50	66	70	62	70	4	73	82,0	52,0	15,0	2,5	6	21,0	M6
53	69	73	65	73	4	76	82,0	52,0	15,0	2,5	6	21,0	M6
55	71	75	67	75	4	78	82,0	52,0	15,0	2,5	6	21,0	M6
58	78	83	70	78	4	85	90,0	60,0	15,0	2,5	6	26,0	M6
60	80	85	72	80	4	87	90,0	60,0	15,0	2,5	6	26,0	M6
63	83	88	75	83	4	90	90,0	60,0	15,0	2,5	6	26,0	M6
65	85	90	77	85	4	92	90,0	60,0	15,0	2,5	6	26,0	M6
68	88	93	81	90	4	95	90,0	60,0	15,0	2,5	7	26,0	M6
70	90	95	83	92	4	97	94,0	60,0	17,0	2,5	7	26,0	M6
75	99	104	88	97	4	106	95,5	61,5	17,0	2,5	7	25,5	M8
80	104	109	95	105	4	111	95,5	61,5	17,0	3,0	7	25,5	M8
85	109	114	100	110	4	116	95,5	61,5	17,0	3,0	7	25,5	M8
90	114	119	105	115	4	123	95,5	61,5	17,0	3,0	7	25,5	M8
95	119	124	110	120	4	128	95,5	61,5	17,0	3,0	7	25,5	M8
100	124	129	115	125	4	133	95,5	61,5	17,0	3,0	7	25,5	M8
105	130	135	120	130	4	139	110,0	70,0	20,0	3,0	7	30,5	M8
110	135	140	125	135	4	144	110,0	70,0	20,0	3,0	7	30,5	M8
115	140	145	130	140	4	149	110,0	70,0	20,0	3,0	7	30,5	M8
120	**145**	**150**	**135**	**145**	**4**	**154**	**110,0**	**70,0**	**20,0**	**3,0**	**7**	**30,5**	**M8**
125	150	155	140	150	4	159	110,0	70,0	20,0	3,0	7	30,5	M8

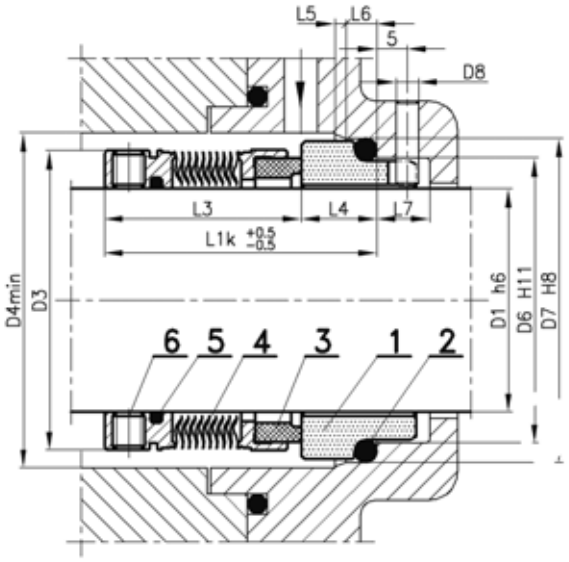
* tolerance of L_3 dimension is ± 0.5 mm
Other dimensions are available in option. Please contact ANGA.

E1 EN 12756

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

* - see diagram „Thermal resistance of elastomers".

- 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 in option. Please contact ANGA.

Legend

1. Stationary ring type A0
2. O-ring
3. Rotating ring
4. Seal housing and metal bellows
5. O-ring
6. Set screw

Application

Type **E1** mechanical seals are destined for petrochemical, chemical, pharmaceutical and food processing industry, 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.

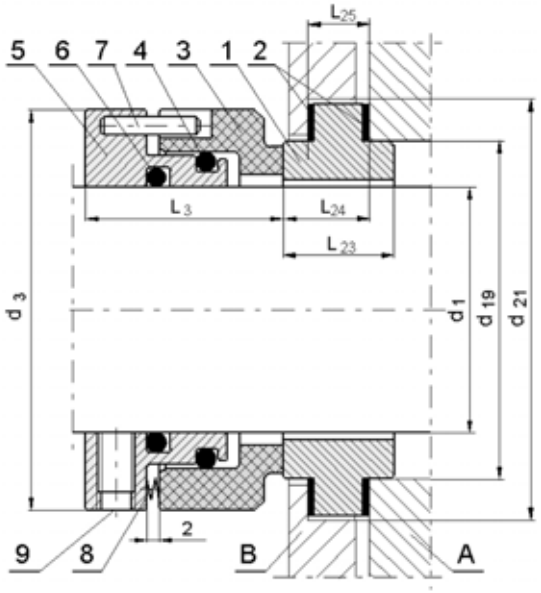
Materials

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

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

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

* - see diagram „Thermal resistance of elastomers".



Legend

1. Stationary ring
2. Gasket
3. Rotating ring
4. O-ring
5. Seal housing
6. O-ring
7. Drive pin
8. Spring
9. Set screw

A - Pump stuffing box

B - Stationary ring cover

Application

Outside mounted mechanical seal is destined for low aggresive 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

Dimensions (mm)

d1	d3	d19(bore)	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

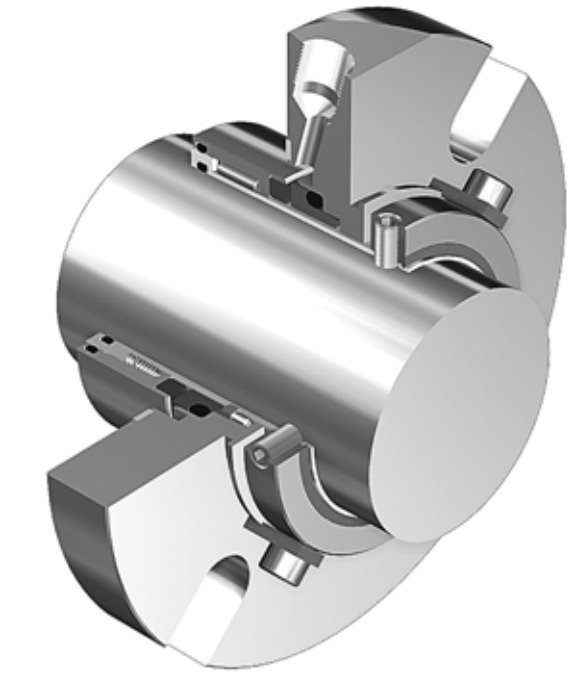
* tolerance of L_3 dimension is ± 0.5 mm
Other dimensions are available in option. Please contact ANGA.

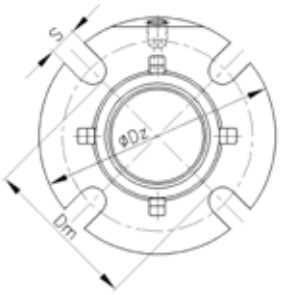
USC

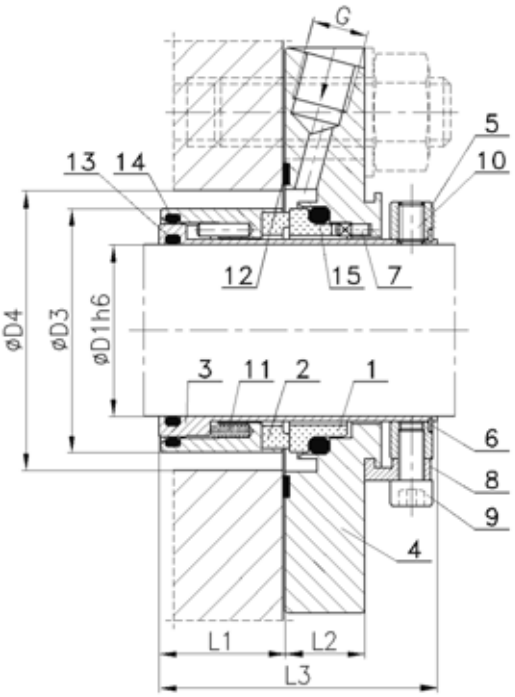
Operating limits		
Pressure	p_{max}	2.0 MPa
Temperature	t_{max}	180 °C *
Speed	v_{max}	12,5 m/s

* - see diagram „Thermal resistance of elastomers".

- Single mechanical seal
- Compact 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 in option. Please contact ANGA.

Legend

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

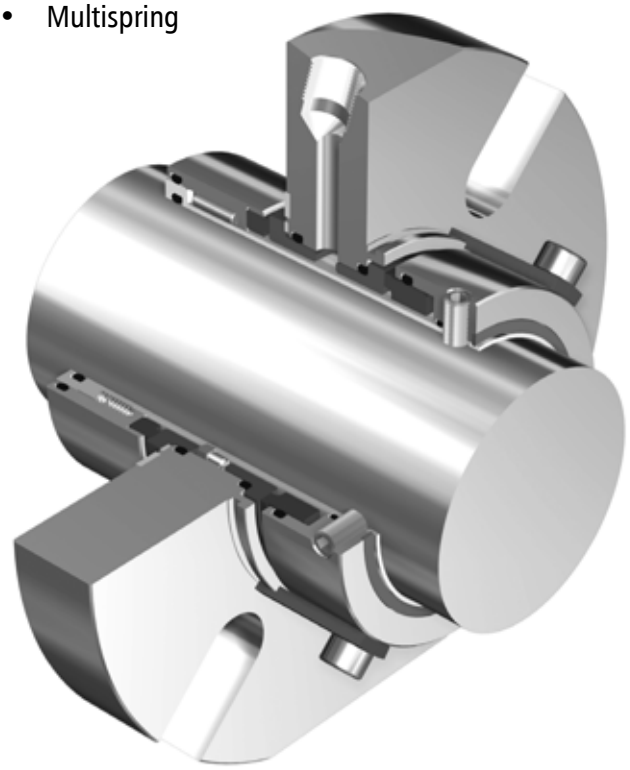
Application

Type **USC** is destined for a wide range of application. It handles such fluids as cold and hot water, oils, petroleum products, low-aggressive chemical substances and other fluids containing abrasive particles.

Materials

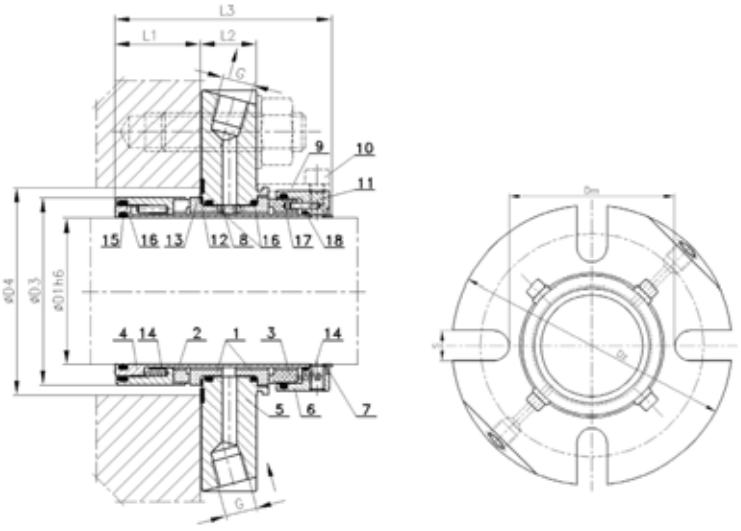
Part	Code
Pierścienie stałe i obrotowe	A, B, U, Q
Secondary, flexible seals	E, P, K, V
Spring	M
Other metal parts	G

- Double seal
- Compact design
- Balanced
- Dual directional
- Multispring



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

* - see diagram „Thermal resistance of elastomers".



Legend

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

Application

USP is a mechanical seal used for high viscosity products containing abrasive particles.
USP mechanical seal requires following fluid installations

- quench (API Plan 52) or
- barrier (API Plan 53);
  max. pressure of barrier fluid 1.6 MPa.

Attention

Max. overpressure of barrier fluid 0.6 MPa

Materials

Part	Code
Rotating ring	A, B, U, Q
Stationary ring	Q, U
Secondary, flexible seals	V

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

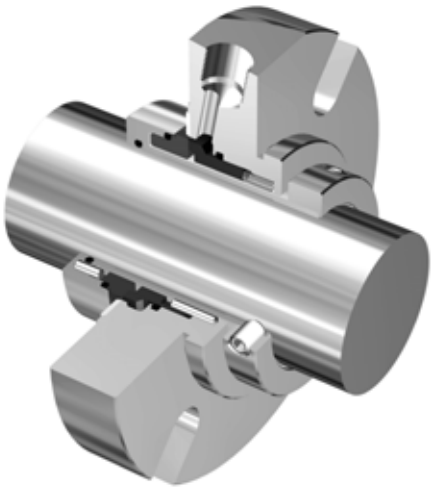
Other dimensions are available in option. Please contact ANGA.

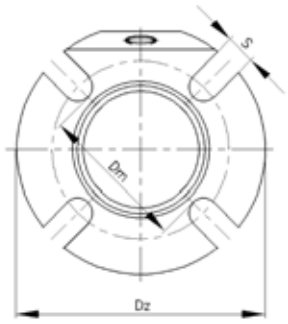
BE2

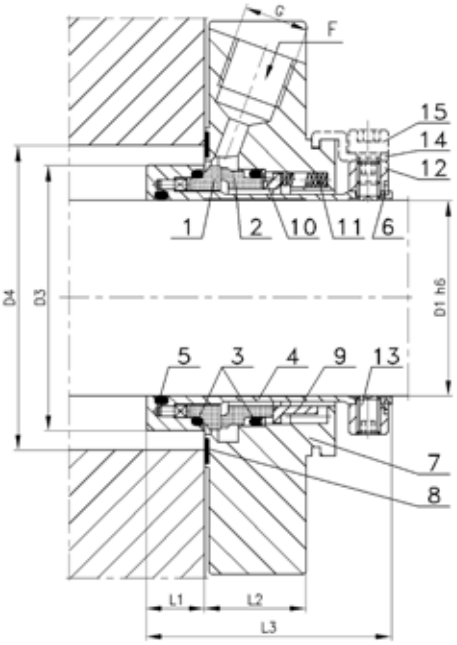
Operating limits		
Pressure	p_{max}	2.0 MPa
Temperature	t_{max}	200 °C *
Speed	v_{max}	12,5 m/s

* - see diagram „Thermal resistance of elastomers".

- Single cartridge (compact) mechanical seal,
- Balanced
- Dual directional
- Multispring







Legend

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

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 in option. Please contact ANGA.

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

Features

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

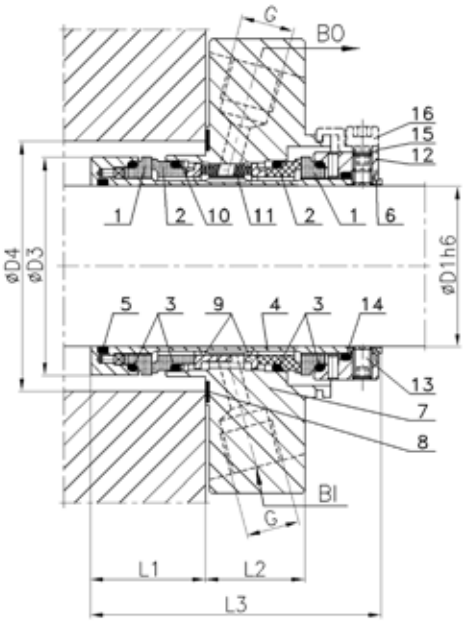
Materials

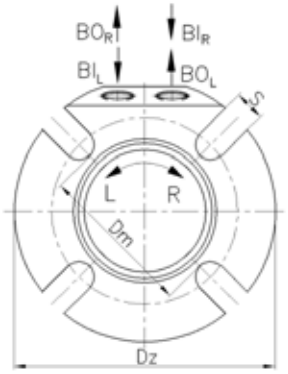
Part	Code
Rotating ring	B, U2, Q
Stationary ring	U2, Q, V, S
Secondary, flexible seals	E, P, K, V
Spring	M
Other metal parts	G

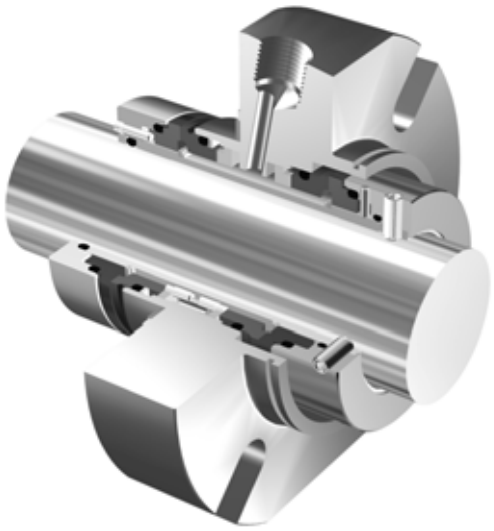
- Double cartridge (compact)
- Mechanical seal
- Balanced
- Multi-spring
- Dual directional

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

* - see diagram „Thermal resistance of elastomers".







Legend

1. Rotating ring
2. Stationary ring
3. O-ring
4. Sleeve
5. O-ring
6. Expanding ring
7. Cover
8. Flat gasket
9. Hold ring
10. Thrust ring
11. Spring
12. Housing
13. Set screw
14. O-ring
15. Distance plate
16. Hex screw

Application

Type BED mechanical seals are destined for process centrifugal pumps and mixers handling fluids containing abrasive particles (ashes, ores, cement and other similar), heavy consistence or gluey slurries and used mostly in following industries: petrochemical, refinery, chemical, pulp & paper, sugar and in wastewater treatment plants. BED type seal requires application of buffer liquid (API PLAN 52) or barrier liquid installation (API PLAN 53). Maximum pressure of the buffer fluid is 1.8 MPa.

Attention

- Depending on kind of sealed liquid a barrier fluid installation is required to the seal, see page with auxiliary installations.
- If temperature of the sealed liquid exceeds 80°C, installation with a cooler shall be used.

Materials

Part	Code
Pierścienie stałe i obrotowe	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

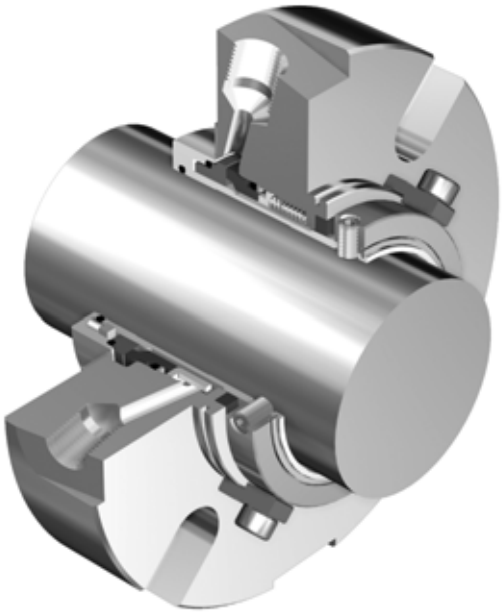
Other dimensions are available in option. Please contact ANGA.

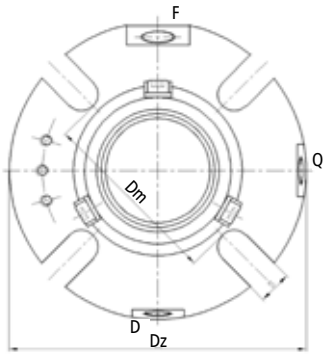
BEQ

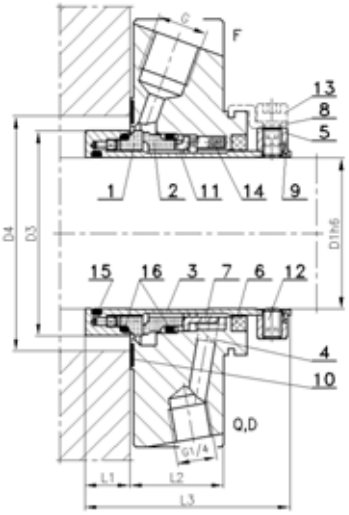
Operating limits		
Pressure	p_{max}	2.0 MPa
Temperature	t_{max}	260 °C *
Speed	v_{max}	12,5 m/s

* - see diagram „Thermal resistance of elastomers".

- 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 in option. Please contact ANGA.

Legend

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

Application

Type **BEQ** is a general purpose mechanical seal with wide scope of applications.
It is destined for hot and cold water, oils, fuels, low aggressive chemicals and other liquids containing solid particles. Due to compact design it is suitable for stuffing boxes with packing seals. Type BEQ mechanical seal can be connected to external flushing installation acc. to the API Plan 11/61 or 32/61.

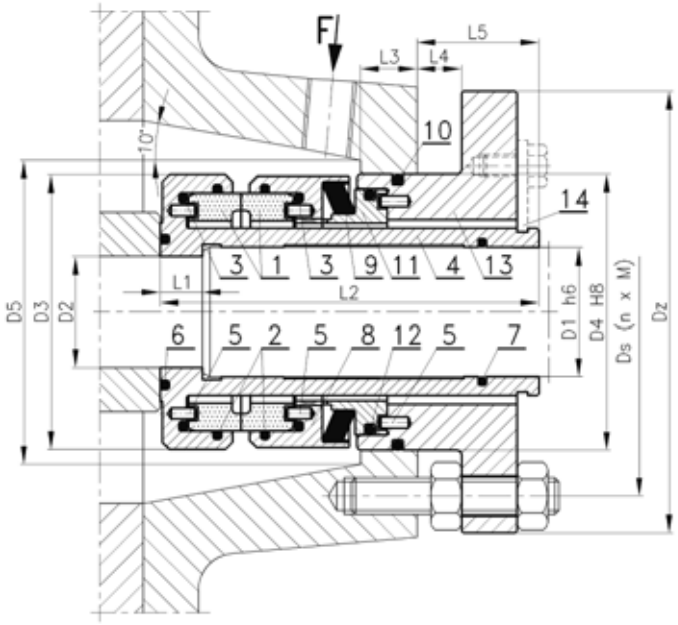
Materials

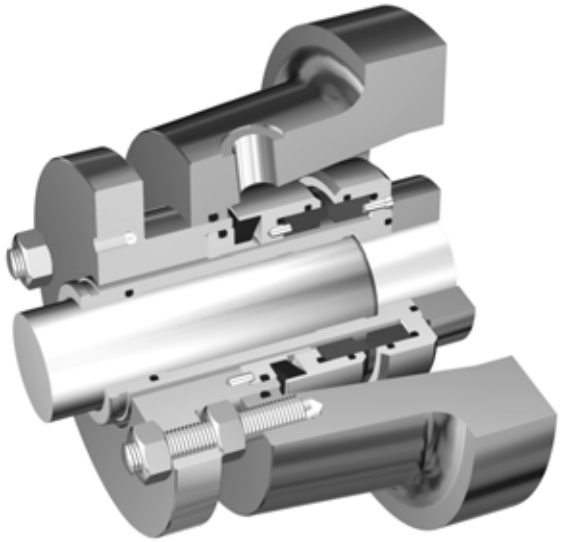
Part	Code
Rotating ring	Q, U
Stationary ring	A, B, Q
Secondary, flexible seals	E, P, K, V
Spring	M
Other metal parts	G

- Single
- Balanced
- Dual directional seal
- Without springs

Operating limits		
Pressure	p_{max}	1.0 MPa
Temperature	t_{max}	80 °C *
Speed	v_{max}	20 m/s

* - see diagram „Thermal resistance of elastomers".





Legend

1. Sliding ring
2. O-ring
3. O-ring
4. Sleeve
5. Straight pin
6. O-ring
7. O-ring
8. Permanent socket
9. Sealing ring
10. O-ring
11. Sleeve
12. O-ring
13. Cover
14. Locking plate

Application

UVP is a universal, mechanical seal of simple and compact design, easy in assembly and servicing, with the possibility of the sliding pair pressure control.
Intended to operation with thick liquids, containing abrasive particles (sludge, cement pulp, ash, whitewash) in power engineering (desulfurization of combustion gases), heat engineering (hydraulic transport of ashes), metallurgy (hydraulic transport of metal ores), in wastewater treatments (sludge and suspensions).

Materials

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

Dimensions (mm)

D1	D2	D3	D4	D5	Ds	Dz	n x M	L1	L2	L3	L4	L5
35	30	74,6	75	83	100	120	2xM10	11	100	14	15	31
45	40	83,0	84	92	105	125	2xM10	35	119	20	20	39
58	50	97,0	100	108	125	150	2xM12	35	131	20	25	46
68	60	125,0	130	138	165	200	2xM16	35	155	25	30	58
78	70	125,0	130	138	165	200	2xM16	35	155	25	30	58
93	85	146,0	150	138	195	240	2xM20	35	166	25	32	62

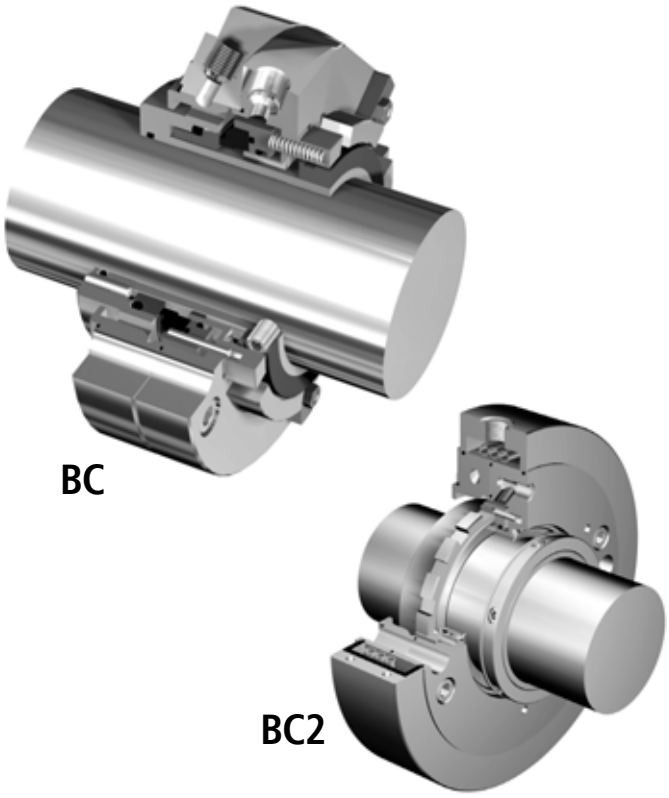
Other dimensions are available in option. Please contact ANGA.

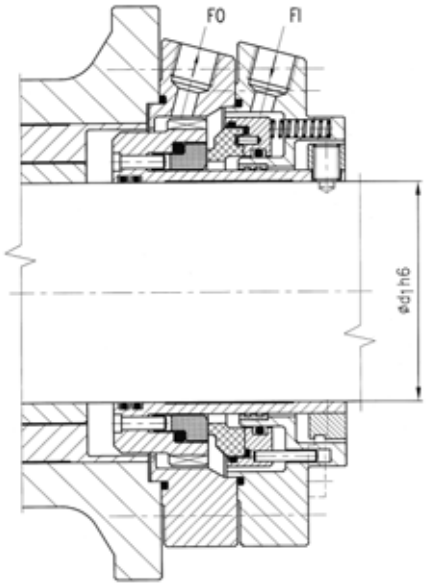
BC, BC2

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

* - see diagram „Thermal resistance of elastomers".

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





Application

Mechanical seals types **BC** are destined for centrifugal pumps and other equipment with rotating shafts handling hot water mainly used in heat and power plants and other industries which 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.

Features

- Cartridge, compact design without auxiliary external installation (cooler, pipes and other equipment),
- easy and quick assembly and disassembly,
- better seal's working conditions - better heat dissipation,
- during pump stop the seal is cooled continuously and o-rings have longer lifetime.

Selection of pumps

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

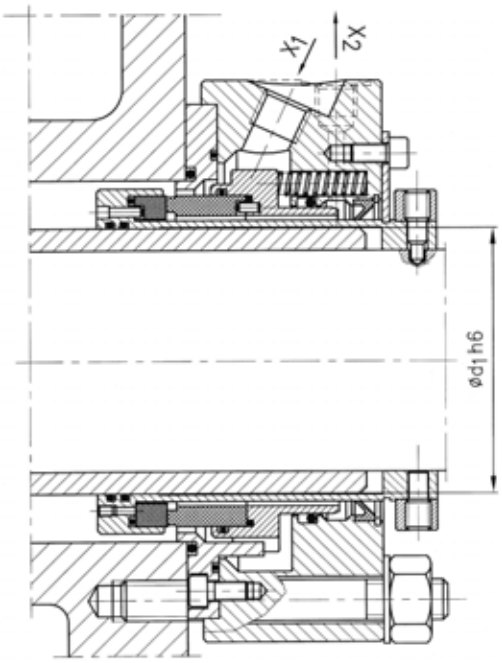
Materials

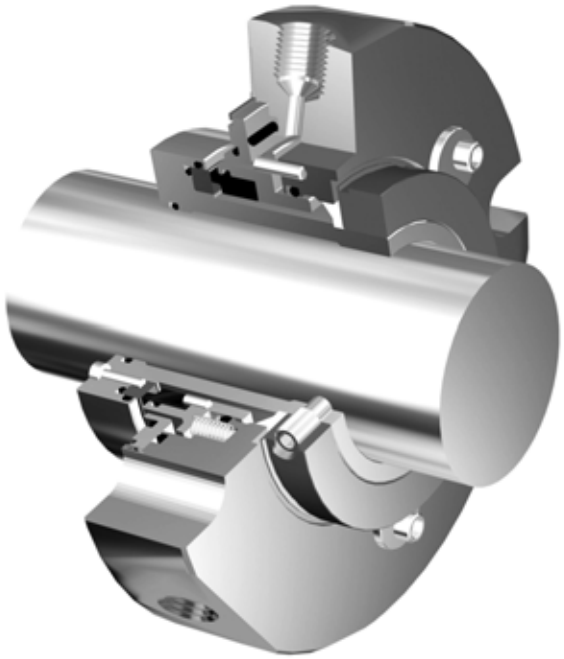
Part	Code
Rotating ring	Q, U
Stationary ring	A, B, Q
Secondary, flexible seals	E, P, K, V
Spring	G, M
Other metal parts	F, G

- Single cartridge (compact) 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 diagram „Thermal resistance of elastomers".





Application

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

Materials

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

Dimensions (mm)

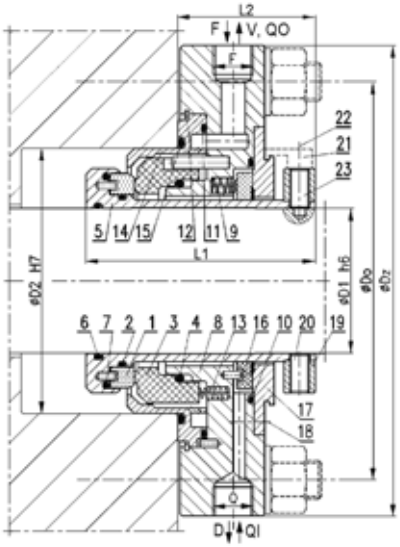
Type of seal	Type of pump	Manufacturers of pumps
49 BD	25 D 17	WAFAPOMP
50 BD	10 K 22	ŚFUP
60 BD	20 K 37	ŚFUP
68 BD	15 K 34	ŚFUP
68 BD	25 K 41, 25 K 40	ŚFUP
72 BD	12 K 28	ŚFUP
80 BD	20 S 28 Wz	WAFAPOMP
80 BD	20 W 39	WAFAPOMP
81(92) BD	W 24 P	WAFAPOMP
85 BD	40 B33, 40 B 36	WAFAPOMP
95(100) BD	35 W 50,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

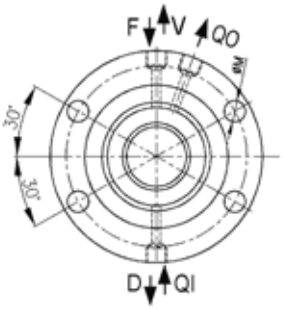
BP

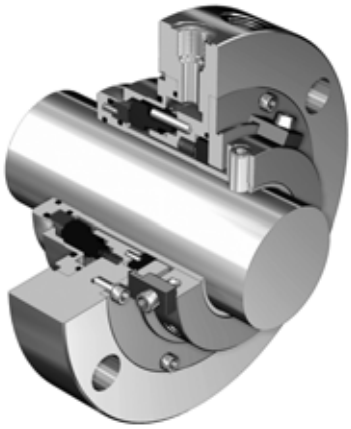
Operating limits		
Speed	v_{max}	15 m/s
Temperature*	Pressure	
t_{max} = - 40 ÷ 80 °C t_{max} = 80 ÷ 130 °C t_{max} = 130 ÷ 180 °C t_{max} = 180 ÷ 250 °C	p_{max} = 3.5 MPa p_{max} = 3.1 MPa p_{max} = 2.8 MPa p_{max} = 2.2 MPa	

* - see diagram „Thermal resistance of elastomers".

- Single mechanical seal
- Cartridge (compact) design
- Balanced
- Independent on direction of rotation
- Multi-spring







Legend

1. Rotating ring BP
2. O-ring
3. Stationary ring BP
4. O-ring
5. Shaft sleeve
6. O-ring
7. O-ring
8. Cover
9. Spring
10. O-ring
11. O-ring
12. Expanding ring BP
13. Springs
14. Cover insert
15. O-ring
16. Throttle ring BP
17. Cover BP
18. Hexagonal screw
19. Fixing ring BP
20. Set screw
21. Distance plate
22. Hexagonal screw
23. Screw

Features

Constructional – operating features:

- compact construction, it fits also into smaller pump stuffing boxes
- easy assembly and disassembly of the mechanical seal
- high resistance against the deformation that could be caused by high pressure and high temperature
- very low emission of volatile substances in 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 in the atmosphere eg. with gas installation (nitrogen) according to API 682 and separates leakage into the secure zone – torch
- the seal's connections enable to build the working arrangments with auxiliary installations according to API 682 plan 11, 12, 13, 21, 22

Application

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

This mechanical seal is destined for the following mediums:

propane-butane, ethanol, acetone, cumene, ethylenic hydrocarbons (olefins CnH2n), with high purity having no abrasive particles.

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

Dimensions (mm)

D1	D2	DZ	D0	L1	L2	M
50	100	176	150	145	107	18
60	110	195	165	145	107	18
70	120	200	170	145	107	18
80	**130**	**210**	**180**	**145**	**107**	**22**
90	140	220	190	145	107	22

Other dimensions are available in option. Please contact ANGA.

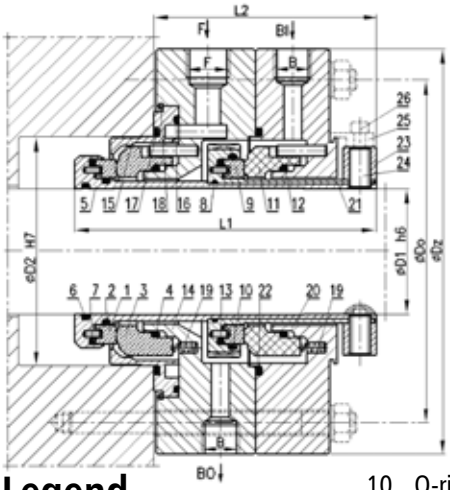
Materials

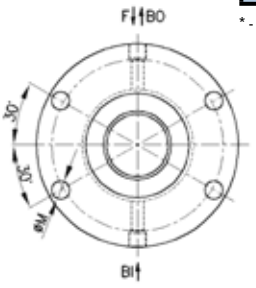
Part	Code
Rotating ring	A, Q, U
Stationary ring	Q, U
Secondary, flexible seals	E, V, K
Spring	M
Other metal parts	G, M

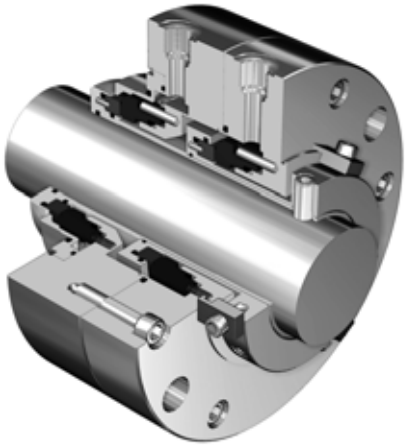
- Double mechanical seal
- Cartridge (compact) design
- Balanced, independent on direction of rotation
- Multi-spring
- Work with quench or barrier fluid auxiliary installation.

Operating limits		
Speed	v_{max}	15 m/s
Temperature*	Pressure	
t_{max} = - 40 ÷ 80 °C	p_{max} = 3.5 MPa	
t_{max} = 80 ÷ 130 °C	p_{max} = 3.1 MPa	
t_{max} = 130 ÷ 180 °C	p_{max} = 2.8 MPa	
t_{max} = 180 ÷ 250 °C	p_{max} = 2.2 MPa	

* - see diagram „Thermal resistance of elastomers".







Legend

1. Rotating ring BP
2. O-ring
3. Stationary ring BP
4. O-ring
5. Shaft sleeve
6. O-ring
7. O-ring
8. O-ring
9. Rotating ring BP
10. O-ring
11. Stationary ring BP
12. O-ring
13. O-ring
14. Cover I
15. Cover insert
16. O-ring
17. O-ring
18. Expanding ring BP
19. Spring
20. Cover II
21. Sleeve
22. O-ring
23. Fixing ring BP
24. Set screw
25. Distance plate
26. Hexagonal screw

Application

BPD is an universal mechanical seal designed especially for the 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 destined for the following mediums: propane-butane, ethanol, acetone, cumene, ethylenic hydrocarbons (olefins CnH2n), with high purity 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

Features

Constructional – operating features:

- compact construction, it fits also into smaller pump stuffing boxes
- high working security, the seal eliminates explosion hazards by having a tandem seal arrangement what restricts the emission of volatile substances into the atmosphere
- high resistance against 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 to API 682 plan 54
- low friction due to the optimal form of main sealing rings
- a possibility to monitor the seals working conditions by quench fluid control
- the seal's 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 doesn't stop working also after the failure of the main seal
- easy assembly and disassembly of the mechanical seal

Dimensions (mm)

D1	D2	DZ	D0	L1	L2	M
50	100	176	150	145	107	18
60	110	195	165	145	107	18
70	120	200	170	145	107	18
80	**130**	**210**	**180**	**145**	**107**	**22**
90	140	220	190	145	107	22

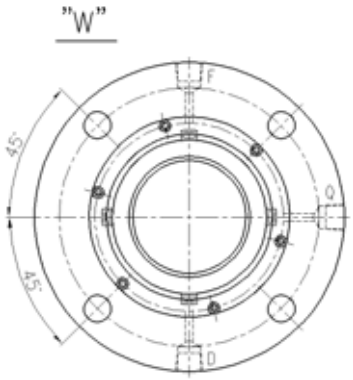
Other dimensions are available in option. Please contact ANGA.

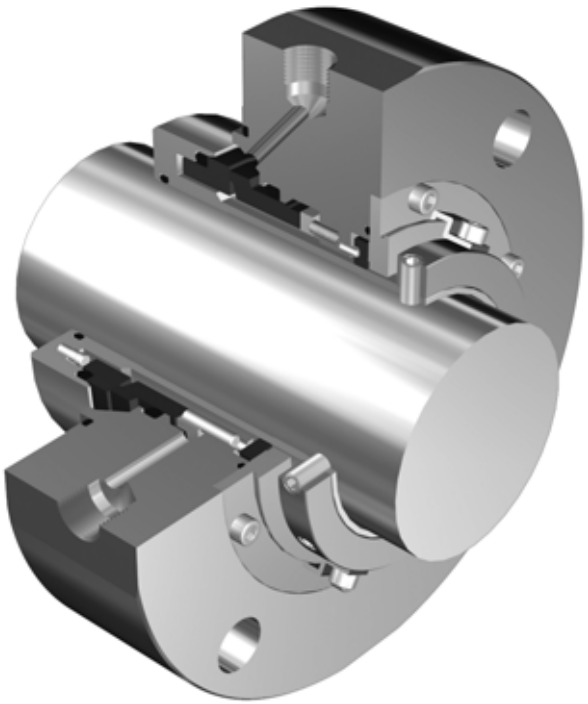
BU

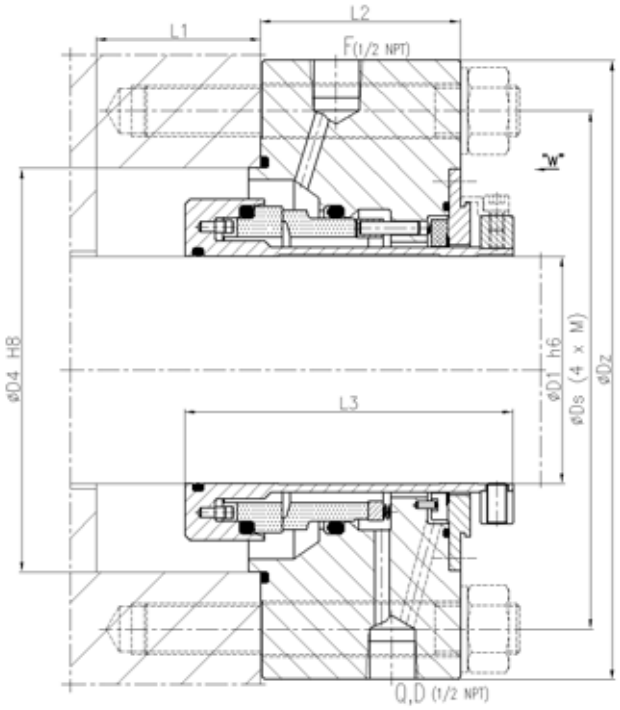
Operating limits		
Pressure	p_{max}	4.2 MPa
Temperature	t_{max}	180 °C *
Speed	v_{max}	20 m/s

* - see diagram „Thermal resistance of elastomers".

Single mechanical seal, cartridge type, balanced, acc. to PN-EN ISO 21049 (API 682, 3rd edition); type A, category 2, arrangement 1, configuration 1CW-FL (with floating graphite bushing); independent of the direction of shaft rotation.







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 PN-EN ISO 21049 (API 682 3rd Edition), Plans: 11/61, 11/62, 12/61, 12/62, 13/61, 13/62.

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 in option. Please contact ANGA.

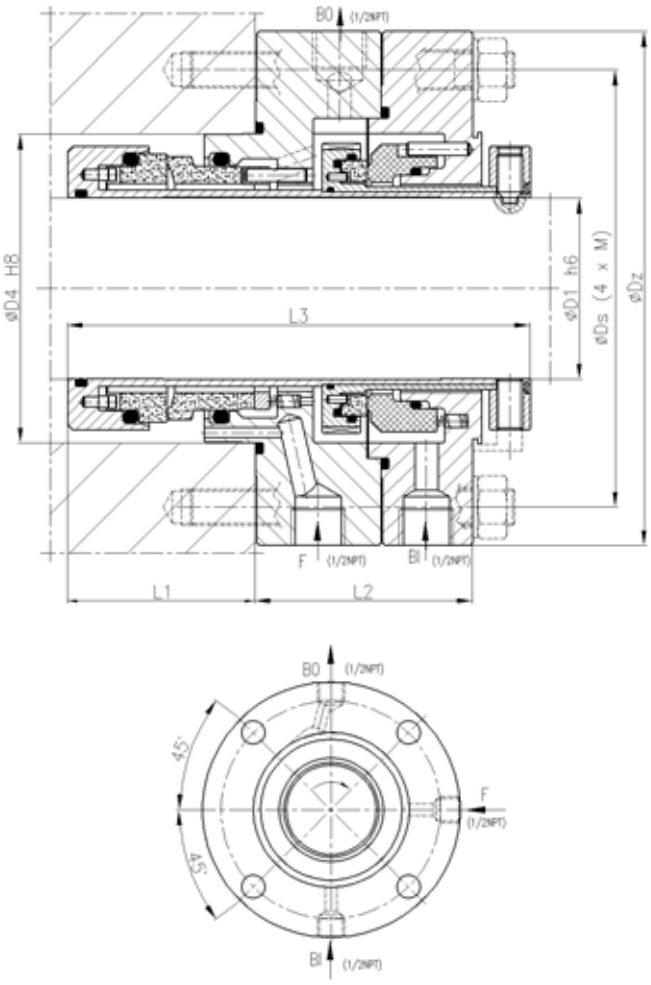
Materials

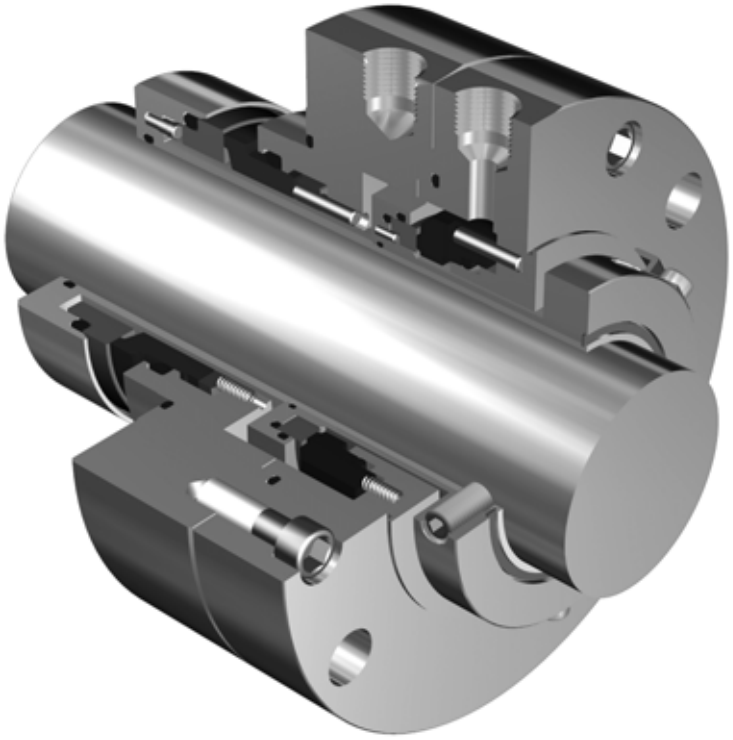
Part	Code
Rotating ring	Q, U
Stationary ring	A, B, Q, U
Secondary, flexible seals	V, K, M
Spring	M
Other metal parts	G, M

Double mechanical seal, cartridge type, balanced, acc. to PN-EN ISO 21049 (API 682, 3rd edition); type A, category 2 or 3, arrangement 2 or 3, configuration 2CW-CW or 3CW-FB; dependent on the direction of shaft rotation.

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

* - see diagram „Thermal resistance of elastomers".





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 PN-EN ISO 21049 (API 682 3rd Edition),
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 in option. Please contact ANGA.

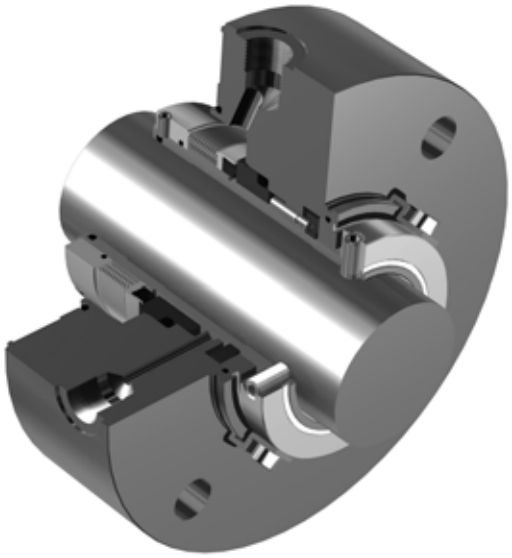
EP

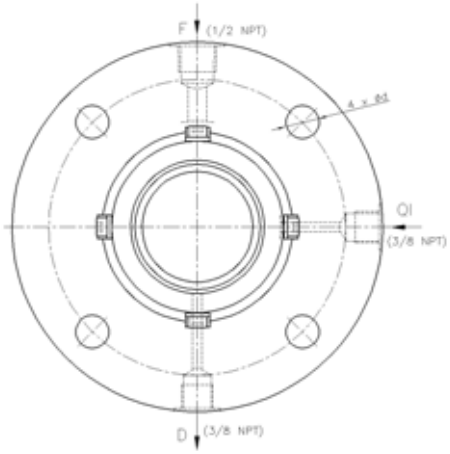
Operating limits		
Pressure	p_{max}	2,0 MPa
Temperature	t_{max}	200 °C *
Speed	v_{max}	20 m/s

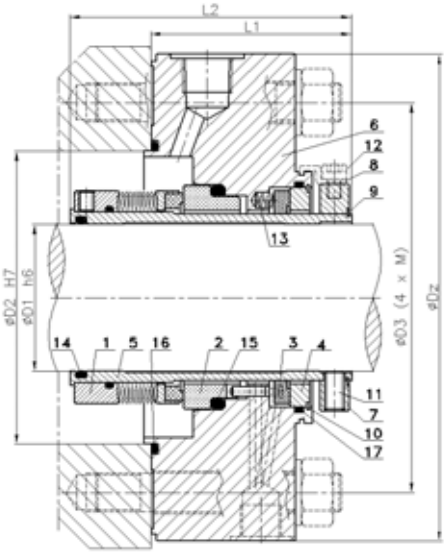
* - see diagram „Thermal resistance of elastomers".

- single mechanical seal
- metal bellows
- independent of direction of rotation
- balanced
- cartridge design

Classification acc. to API: category 2 (stuffing box dimensions acc. to ISO 13709) or category 1 (any stuffing boxes); type B (1CW-FL)







Legend

1. Rotary part E1
2. 2. Stationary ring
3. 3. Throttle ring EP
4. 4. Thrust ring EP
5. 5. Sleeve EP
6. 6. Cover EP
7. Clamp ring EP
8. 8. Distance plate EP.
9. 9. Retaining ring
10. 10. Retaining ring
11. 11. Set screw
12. 12. Hex screw
13. Spring
14. O-ring
15. O-ring
16. O-ring
17. O-ring

F – flushing / vent
Q – quench
D - drain

Features

- implementation of non-sparking carbon graphite throttle ring enables blocking emission of volatile substances to 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 to the atmosphere
- supplied seal is fully assembled which excludes the possible mistakes during the assembly process

Application

EP is designed for operate with hydrocarbons present in oil refining processes. It is designed according to ISO 21049 (API 682 3rd edition) 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

Dimensions (mm)

D1	D4	DS	DZ	L1	L2	L3	M
20	70	105	140	14	82	105	M12x1,75
30	80	115	150	14	82	105	M12x1,75
40	90	125	160	14	82	105	M12x1,75
50	100	140	190	18	82	110	M16x2,0
60	120	160	200	18	82	115	M16x2,0
70	130	170	210	18	82	115	M16x2,0
80	140	180	220	18	87	125	M16x2,0
90	160	205	250	22	87	125	M20x2,5
100	170	215	260	22	87	125	M20x2,5
110	180	225	270	22	87	125	M20x2,5

Other dimensions are available in option. Please contact ANGA.

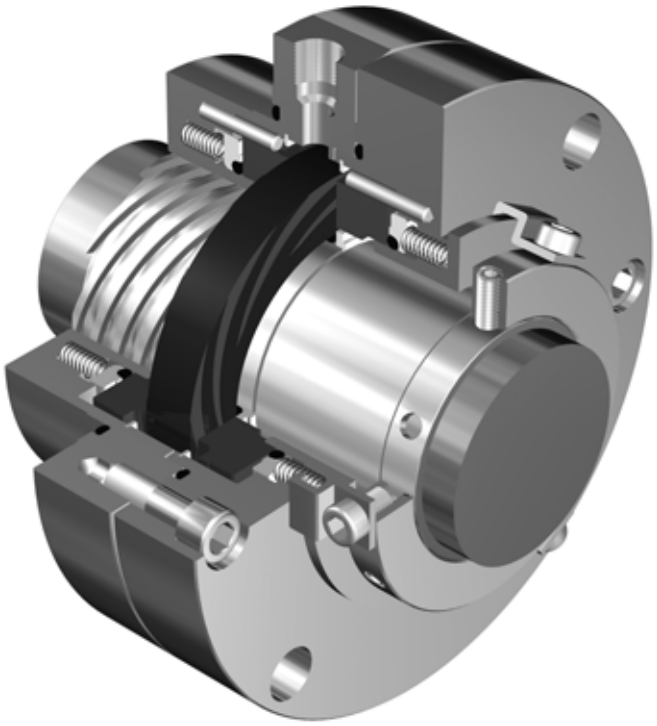
Materials

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

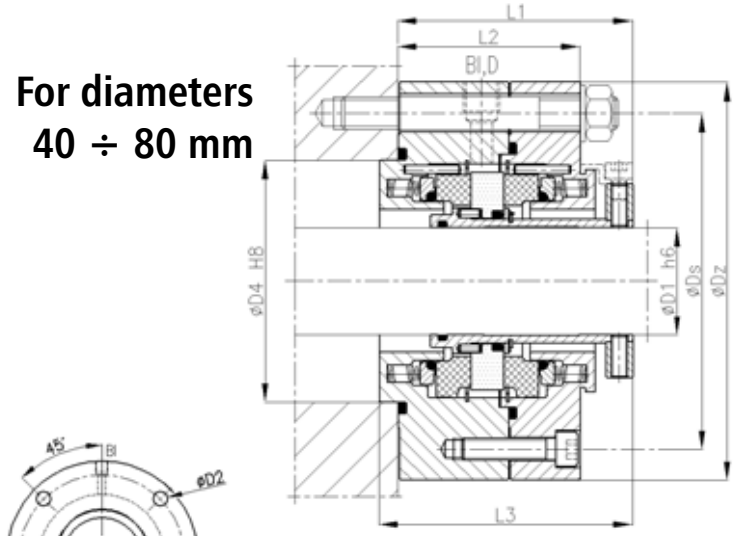
- double gas-lubricated seal ("face to face")
- cartridge design
- dependent on direction of rotation:
  GK4 - clockwise,
  GK3 - counterclockwise
- multi-spring
- requires a barrier gas supply
- non-contacting operation

Operating limits		
Pressure	p_{max}	2,0 MPa
Temperature	t_{max}	170 °C *
Speed	n	1000 ÷ 4000 1/min

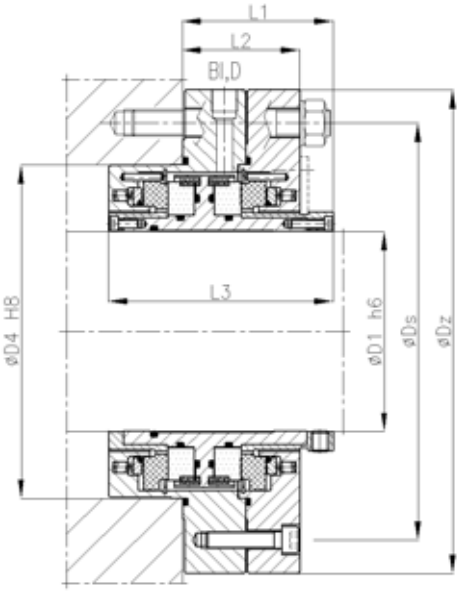
* - see diagram „Thermal resistance of elastomers".



For diameters 40 ÷ 80 mm



For diameters 90 ÷ 160 mm



Application

GK4 seals are intended to use in pumps and compressors operating in explosive environment or handling toxic and hazardous substances. The main areas of its application are: chemical, petrochemical, refinery and coke industry, 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

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

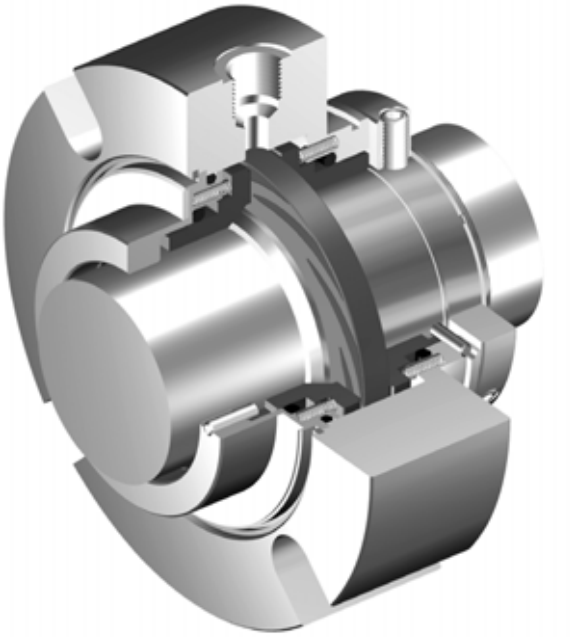
Other dimensions are available in option. Please contact ANGA.

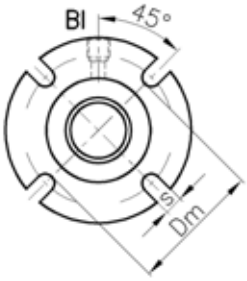
GF

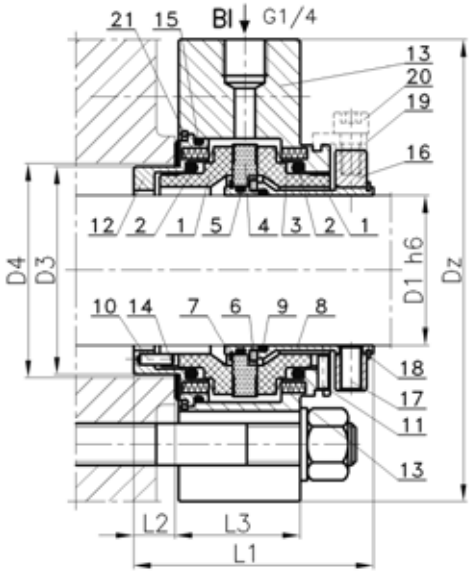
Operating limits		
Pressure	p_{max}	1.2 MPa
Temperature	t_{max}	200 °C *
Speed	v_{min}	1 m/s

* - see diagram „Thermal resistance of elastomers".

- Double cartridge (compact) gas lubricated seal
- Balanced
- Non-contacting
- Multi-spring
- Face-to face
- Type GF seal is dependent on the direction of the shaft rotation: (GFR) – right; (GFL) – left
- Barrier gas: nitrogen or pressurized air.







Features

- very long lifetime and long MTBF (mean time between failures),
- no emission of harmful medium to 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 on occurrence a barrier gas pressure failure, the seal continues operation in the contact mode).

Legend

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

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 in option. Please contact ANGA.

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

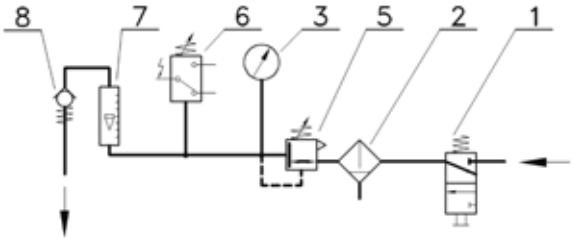
Part	Code
Rotating ring	Q, U
Stationary ring	A, B
Secondary, flexible seals	E, V, K
Spring	G
Other metal parts	G

Supply unit

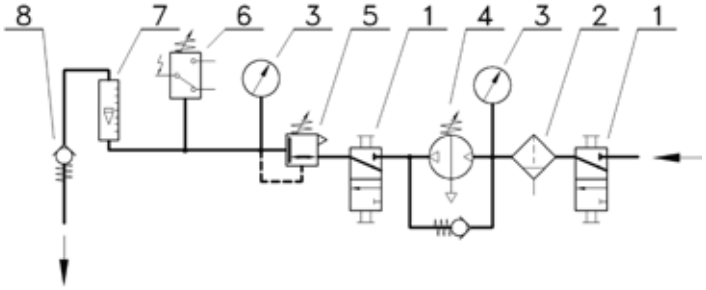
Supply unit is a necessary constant element of gas lubricated seals.

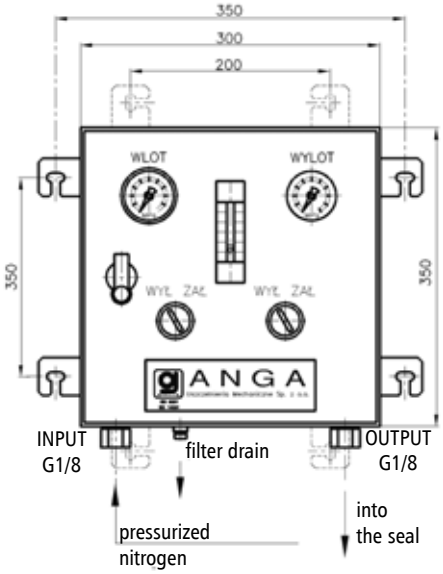
• The units are designed as single or multiple systems (e.g. for two seals or more, supplied from one unit).

Supply unit without pressure amplifier



Supply unit with pressure amplifier (x2 or x4)

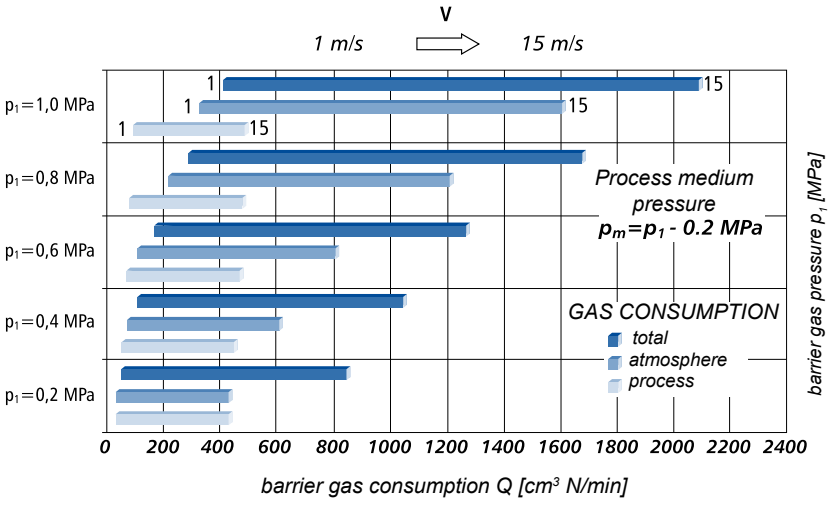




Description of components of the supply unit

1. Cut-off valve
2. Filter
3. Pressure gauge
4. Hydraulic amplifier
5. Pressure reducing valve
6. Air-operated electromagnetic relay
7. Flowmeter
8. Non-return 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 actual pressure in existing industrial network.

Dimensions, materials

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

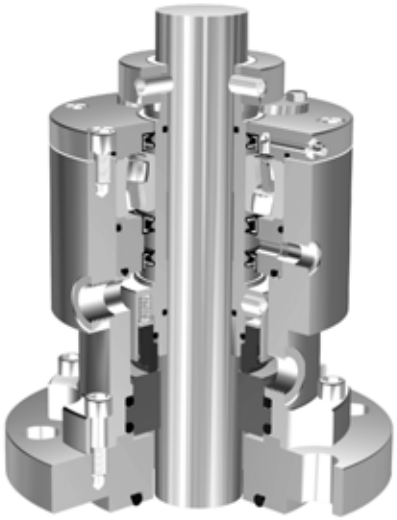
Please contact ANGA

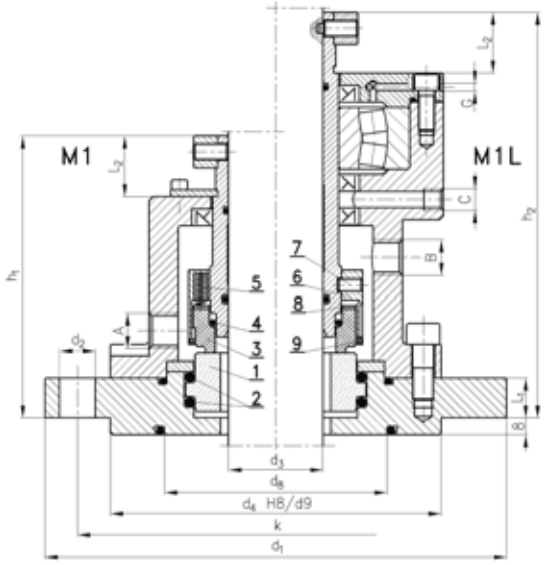
M1, M1L

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

* - see diagram „Thermal resistance of elastomers".

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





Materials

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

Legend

1. Stationary ring type M0
2. O-ring
3. Rotating ring
4. O-ring
5. Spring
6. Seal housing
7. Set screw
8. Spring thrust ring

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

Application

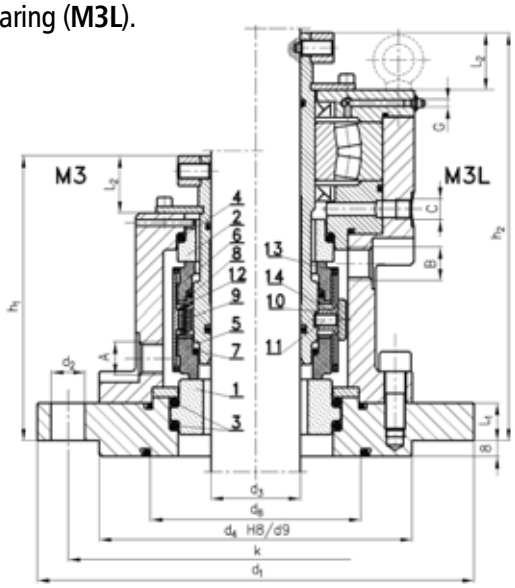
Type **M1**, **M1L** mechanical seals are applied to seal top, bottom and side entry drives in agitators, mixers or blenders in case when non-aggressive and non-hazardous media are sealed with the use of cooling liquid preventing against dry running.

Dimensions (mm)

d3	d1	n x d2	d4	d8	k	l1	l2	h1	h2	A,B	C,G
40	175	4x18	110	70	145	22	22	130	191	G 3/8	G 1/8
50	240	8x18	176	135	210	22	22	132	201	G 3/8	G 1/8
60	240	8x18	176	135	210	22	22	138	207	G 3/8	G 1/8
70	240	8x18	176	135	210	22	25	147	229	G 3/8	G 1/8
80	275	8x22	204	155	240	24	25	155	246	G 1/2	G 1/8
90	275	8x22	204	155	240	24	25	155	256	G 1/2	G 1/8
100	305	8x22	234	190	270	28	25	158	262	G 1/2	G 1/8
110	305	8x22	234	190	270	28	25	161	277	G 1/2	G 1/8
120	330	8x22	260	215	295	28	25	165	285	G 1/2	G 1/8

Other dimensions are available in option. Please contact ANGA.

- Double mechanical seals
- Balanced
- Multi-spring
- Dual directional and either without bearing (**M3**) or with bearing (**M3L**).



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

* - see diagram „Thermal resistance of elastomers".

Legend

1. Stationary ring
2. Stationary ring
3. O-ring
4. O-ring
5. Rotating ring
6. Rotating ring
7. O-ring
8. O-ring
9. Springs
10. Seal housing
11. Set screw
12. Thrust plate
13. Snap spring ring
14. Pumping screw (option)

CONNECTORS
A – coolant inlet
B – coolant outlet
O – leakage outlet
G – grease point

Materials

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

Application

Type **M3**, **M3L** mechanical seals are used to seal agitators, mixers and blenders as top, bottom and side entry drives and working with the use of coolant and buffer fluid and applied in cases of aggressive and hazardous media.

Dimensions (mm)

d3	d1	n x d2	d4	d8	k	l1	l2	h1	h2	A,B	C,G
40	175	4x18	110	70	145	22	22	175	230	G 3/8	G 1/8
50	240	8x18	176	135	210	22	22	175	240	G 3/8	G 1/8
60	240	8x18	176	135	210	22	22	190	260	G 3/8	G 1/8
70	240	8x18	176	135	210	22	25	190	260	G 3/8	G 1/8
80	275	8x22	204	155	240	24	25	195	280	G 1/2	G 1/8
90	275	8x22	204	155	240	24	25	195	280	G 1/2	G 1/8
100	305	8x22	234	190	270	28	25	200	300	G 1/2	G 1/8
110	305	8x22	234	190	270	28	25	200	300	G 1/2	G 1/8
120	330	8x22	260	215	295	28	25	200	320	G 1/2	G 1/8

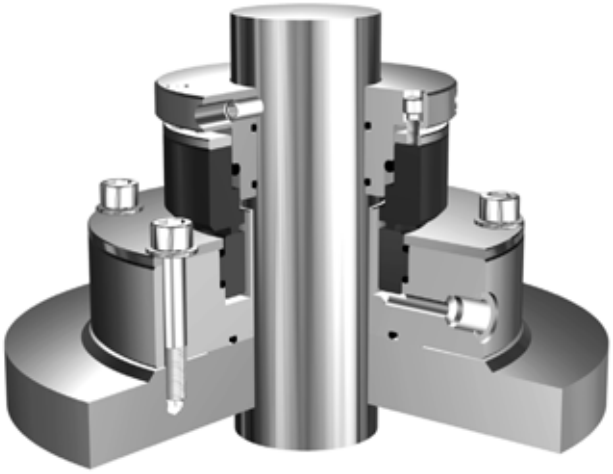
Other dimensions are available in option. Please contact ANGA.

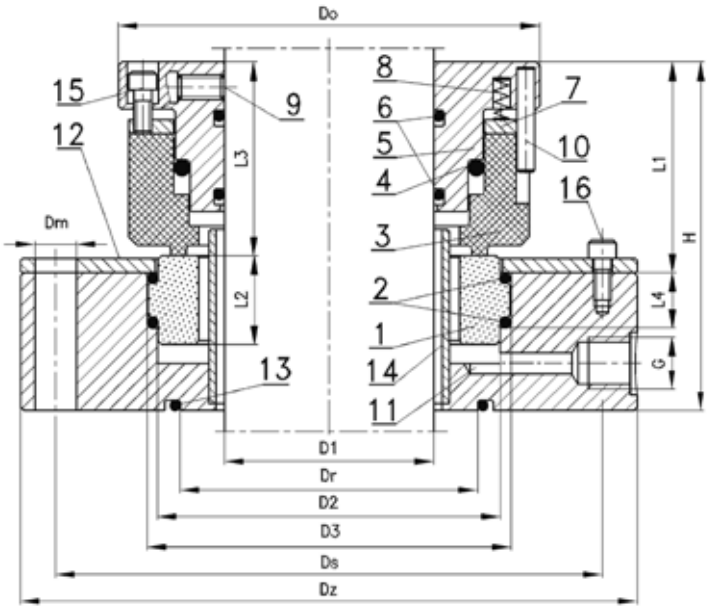
MS

Operating limits		
Pressure	p_{max}	0,6 MPa
Temperature	t_{max}	260 °C *
Speed	v_{max}	2,5 m/s

* - see diagram „Thermal resistance of elastomers".

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





Materials

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

Legend

1. Stationary ring M0
2. O-ring
3. Rotating ring
4. O-ring
5. Seal housing
6. O-ring
7. Retaining ring
8. Spring
9. Set screw
10. Pin
11. Cover
12. Cover
13. O-ring
14. Sleeve
15. Set screw
16. Screw

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 destined for mixers, agitators and other equipment with rotating shafts used mainly in chemical, food processing, pharmaceutical and pulp & paper industries. A special dampening device is available to eliminate dry run screech.

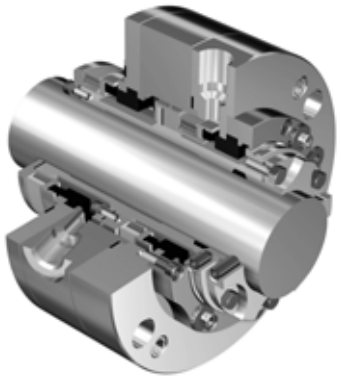
Dimensions (mm)

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 in option. Please contact ANGA.

EPD

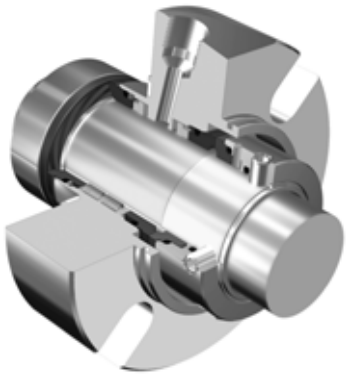
$d = 30..100$ mm $p_{max} = 1.2$ MPa
$t_{max} = 400°C$ $v_{max} = 25$ m/s



Double cartridge mechanical seal, balanced, with metal bellows, multi-spring and dual directional. Secondary seals are made of flexible graphite.
EPD double mechanical seal is designed to work with hot hydrocarbons in petroleum refinery processes.
EPD seal needs auxiliary equipment installed according to Plan 52 or Plan 53 API 682.

BEH

$d = 30..100$ mm $p_{max} = 1.6$ MPa
$t_{max} = 200°C$ $v_{max} = 12.5$ m/s



Dual cartridge mechanical seals, balanced, multi-spring, dependent on shaft rotation. The seal forces the buffer liquid flow.
The BEH is a general purpose, hydrodynamic seal of wide range of application. It is designed to work with media containing abrasive particles and chemicals harmful for the environment.
The BEH seal needs use of external barrier fluid installation.

GKF

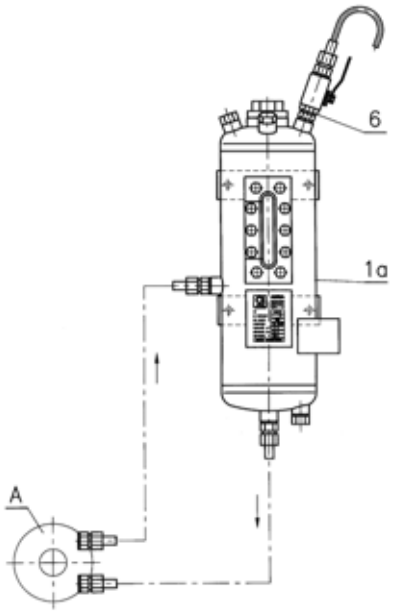
$d = 30..150$ mm $p_{max} = 4$ MPa
$t_{max} = 190°C$ $v_{max} = 100$ m/s

GKF seals are used on various types of fluid-flow compressors. They replace traditional oil, labyrinth, and also segmented seals. Application areas, that are, first of all, the following industries: chemical, refinery, petrochemical, chemistry of coke, transport of technical or natural gases. Sealed media may be gases or vapors of explosive and aggressive liquids, like ammonia, methane, ethylene, propane, toluene, acetone, hydrogen chloride, hydrogen sulfide, carbon monoxide etc.
These seals perfectly perform their role in explosive zones or polluting natural environment ones. Every installation arrangement of dynamical gas seals requires a suitable barrier gas supply installation.

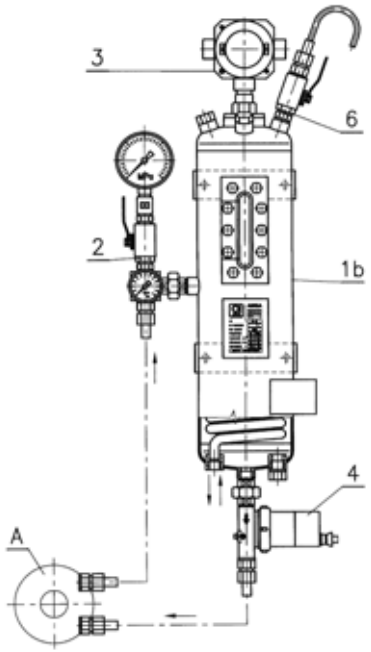
AMS

AMS device (ANGA Monitoring System) is a special measuring instrument designed to monitor and register the basic operating parameters of mechanical seals (e.g. temperature, pressure, rotational speed, flow, barrier liquid level, etc.) that are running on process equipment, various installations in refinery, petrochemical, chemical, food, pharmaceutical industries, and also in municipal and industrial wastewater treatment plants.
The AMS Monitoring Block, depending on sensors used, is able to control the operation of single and double contact

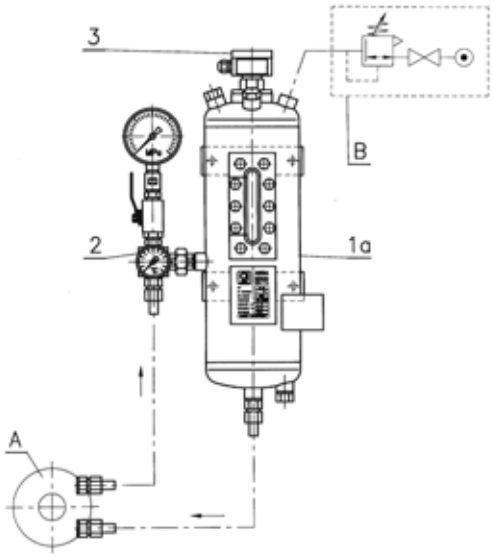
A. Pressureless system with a flushing buffer fluid.



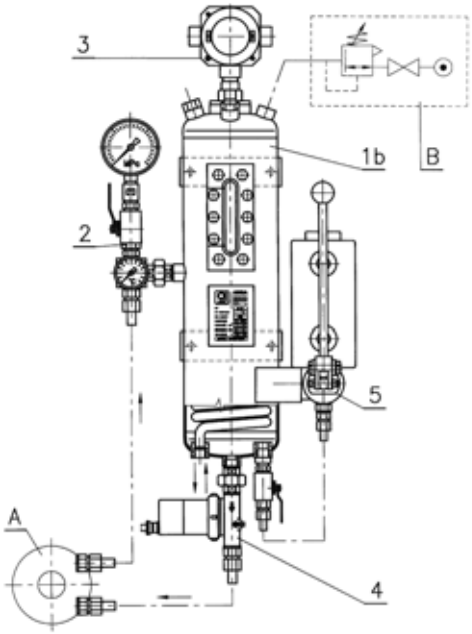
B. Pressureless system with a flushing cooled buffer fluid.



C. Pressure system with a flushing barrier fluid. Barrier fluid circulation forced by pumping ring of the seal.



D. Pressure system with a flushing cooled barrier fluid. Barrier fluid circulation forced by a circulating pump. Barrier fluid refilled by a manual pump.



Legend

A. mechanical seal
B. gas supply unit
1a tank (vessel) without cooler
1b tank (vessel) with integral cooler
2. pressure and temperature measurement unit
3. level monitoring unit (level switch)
4. circulating pump
5. manual pump
6. venting unit (valve)

Refilling-venting units.
Venting units also available.

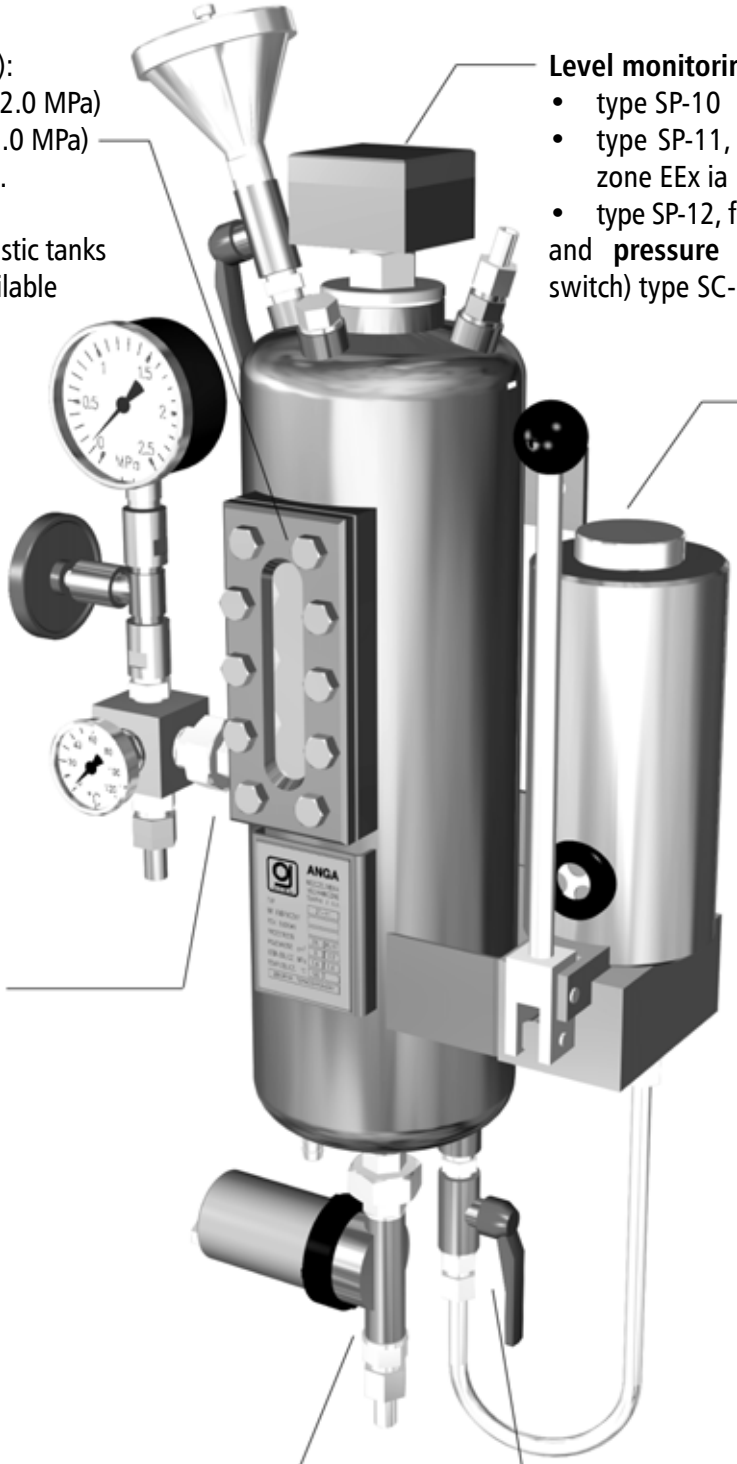
Thermosyphon tanks (vessels):
- ZT-20 (without cooler, 10 l, 2.0 MPa)
- • ZT-21 (with cooler, 10 l, 2.0 MPa)

and all made of acid-proof steel.

There is also poliprophylene plastic tanks type ZP-10 with connectors available (for external flushing systems).

Level monitoring units (level switches):
- type SP-10
- type SP-11, float switch, 2 reed contact, zone EEx ia
- type SP-12, float switch, 2-reed, zone EEx d

and **pressure monitoring unit** (pressure switch) type SC-12, zone EEx d



Manual pump
type PR-10
for tank (vessel) under pressure refilling.

Pressure and temperature **measurement units** in 2 versions:
- • BP-11 (acid-proof steel)
- • BP-10

in several options with arious manometers pressure ranges (from 0-0.6 MPa to 0-4.0 MPa). Separate measurement units also available:
- pressure measurement unit BP-20 and 21
- temperature measurement unit BP-31

Circulating pumps

Connecting and support components:
pipes, connectors, valves, plugs, ends etc.

Other products and services offered by ANGA

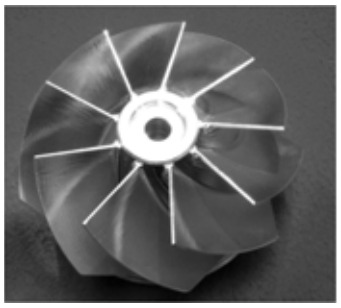
ISO 9001
ISO 14001

ANGA is a leading manufacturer of face mechanical seals in Poland. Thanks to our modern technological and production assets, we are able to offer a wide range of fine machining services.
Our offer includes **sealing branch services**:

- service support of various equipment with mechanical seals (in Poland in 48h from client's request)
- mechanical seals regeneration
- pump stuffing boxes redesign from packing ones to mechanical seal ones
- technical consulting and trainings in the scope of design, selection, instalment and exploitation of mechanical seals
- pump repairs and regeneration

and **other machining-regeneration services**:

- fine machining of components of various machines using numerically controlled machines (CNC)
- fine machining of parts made of hard-to-machining materials



Basic material used in our company is acid-proof steel: Hastelloy®, Monel®, Inconel®, Duplex, Super Duplex, titan, in turn elements of face mechanical seals are made of following materials: pressed and impregnated carbon graphite, silicon carbide, tungsten carbide, , special chromium-molybdenium alloys.

Production of mechanical seals, spare parts and other details (also **in accordance to customer's documentation**) is 100% made on CNC machines. Our machines are state of the art ones:

- turning machines, 2, 3, and 4-axis,
- milling machines, 3 and 5-axis.

It gives as possibility to reach high level of efficiency with short time necessary to start new production. Our production capabilities allow us to offer fine machining in below presented range:

Turning using CNC machines

machined elements	shafts / rollers, rings, disks / shields, sleeves with various profiles, all threads
maximal diameter	up to 180mm / 400mm (it depends on shape of the element)
maximal length	up to 1000 mm
maximal weight of the element	about 20 kg
maximal precision	0,02 mm, Ra 1,25μm

Machining using 4-axial CNC center

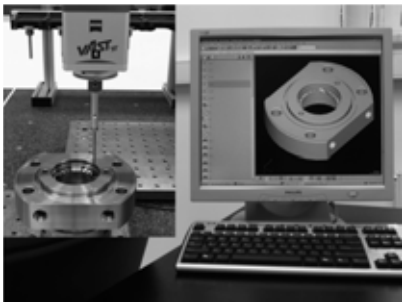
available operations	drilling, milling (also complicated shapes), threading
maximal dimensions of the element	300 x 400 x 200 mm
maximal weight of the element	about 20 kg
precision	0,02 mm

Machining using 5-axial CNC center

available operations	drilling, milling, threading, machining of impeller blades
maximal dimensions of the element	600 x 600 x 500 mm
maximal weight of the element	about 200 kg
precision	7 μm

Moreover we are able to offer the following operations:

- grinding
- polishing
- lapping



It is worth mentioning details machined at above described machines are geometrically measured in the **testing laboratory**. The laboratory is equipped with modern measurement machine ZEISS CONTURA SELECT with measurement space of 600x700x1000 mm and profile measurement gauge TAYLOR HOBSON. Our testing laboratory is accredited by PCA (The Polish Centre for Accreditation) - number of accreditation AB 701. We offer also service of testing and measurement.

Hastelloy® is the registered trademark name of Haynes International, Inc
Monel®, Inconel® are the trademarks of Special Metals Corporation
PTFE Teflon® is the registered trademark name of E. I. du Pont de Nemours and Company.

Products and services offered by CERTECH

The specialty of CERTECH company is applying a ceramics coatings (chromium oxide, aluminium oxide, zirconia oxide) using the plasma spraying technology.

We offer also other methods of thermal spraying for non-ceramics coatings like steel (acid-proof steel, stainless steel, constructional steel), bronze, molybdenum, some types of carbide coatings e.g. chromium carbide, tungsten carbide.

The coatings offered by CERTECH have following features:

- abrasion resistance,
- high chemical resistance,
- thermal shock resistance,
- high corrosion resistance,
- perfect sliding properties.

Appropriately selected coatings assures:

- longer endurance and life time of machines parts, both new and regenerated ones due to change of properties of the top layer,
- costs and raw materials savings,
- time saving,
- less impact on environment.

We also offer machining and production of fine machine parts e.g. slide rings, slide bearings, nozzles, pistons and plungers made of technical ceramics (silicon carbide, al-oxide) belonging to the group of modern, advanced constructional materials.

Silicon carbide is one of the hardest constructional material known. This material is used because of its specific features:

- very high hardness (about 2500 HV),
- perfect abrasion resistance,
- very good chemical resistance,
- thermal shock resistance (~250°C),
- low thermal expansion,
- low density.

The specific property of silicon carbide is also its mechanical endurance, which doesn't change together with growth of temperature even up to1800°C.

We would like to underline in our offer variety of products made of carbon graphite composites.

Parts made of carbon graphite composites works property with other materials like: hardened steel, cast iron, alloy cast steel, aluminum alloys, technical ceramics (silicon carbide, al-oxide, tungsten carbide).

They are used for slide elements like slide bearings, protective sleeves, slide rings etc.

More information is available at the website:
www.certech.pl

„Certech" Sp. z o.o. (Ltd) has been established in 1997 and is a subsidiary of
„ANGA" Uszczelnienia Mechaniczne Sp. z o.o.

CERTECH

ANGA

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